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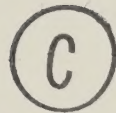
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THE UNIVERSITY OF ALBERTA

THE RELATIONSHIP BETWEEN NEUROTICISM
AND ACADEMIC ATTAINMENT IN TWO
ALBERTA HIGH SCHOOLS

by



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A THESIS

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Abstract

Using a sample of 200 Canadian high school students, this thesis was primarily concerned with discovering the relationships between neuroticism and associated variables, as operationally defined by the Neuroticism Scale Questionnaire (Cattell and Scheier, 1961), and academic attainment as measured by four achievement subtests (mathematics, science, social studies, and English) found in the Stanford Achievement Test - High School Battery.

The major finding was that neuroticism is unrelated to overall academic attainment for the high school sample.

In attempting to explain the general lack of relationship between neuroticism and achievement, the hypothesis was developed, from a survey of existing literature in this area, that the specific research designs of studies dealing with neuroticism-achievement affect the interpretation of results and findings.

Although no relationship was found between neuroticism and overall academic attainment, several interesting relationships were shown to exist between specific neurotic sub-variables and specific achievement tests.

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CHAPTER 1

Introduction

As education has become more and more specialized during recent years, concern over the problems of selection and prediction of academic performance has become more of a focal point for the attention of educational psychologists. Growth in student population, programs designed to identify and support the training of students with outstanding talents, and the development within the social sciences of a concerted study of education are but a few of the fairly recent developments which have highlighted the necessity for improvements in the prediction of academic performance. In increasing numbers, educational institutions and research workers have accumulated a rather prodigious amount of literature relating to this area. Psychological methods have uncovered pertinent information in the fields of intelligence, aptitudes, interests, values, cognitive style, and abilities. In particular, the study of individual differences in ability and intelligence as they relate to academic performance has contributed greatly to the present state of knowledge.

Still, it is unusual to encounter intelligent groups of teachers or parents without hearing someone make the point that, in the past, psychological methods of guidance and selection have relied too exclusively on measures of

intelligence and ability, and have failed to take into account many vital factors of personality and character structure. Indeed, on the whole, the failure of educational psychologists to extend research into the personality field seems quite remarkable. Nearly every research that has been carried out in education in the past has seemed to quite readily assume that all children are equally anxious, introverted, and persistent, as well as being equalitarian with respect to all other personality traits. In short, little progress in the field of academic prediction has been made by educators in availing themselves of the basic advances in personality theory and measurement which have taken place in the post - World War II years, particularly when one considers the volume of research produced. Further, whenever such attempts have been made, they have usually been marked by an absence of a sufficiently far-reaching and systematic employment of factored personality tests.

Thus it was possible for Middleton and Guthrie (1959) to write that "attempts to improve prediction by using non-intellective factors such as personality traits have yielded quite discouraging results" (Personality Syndromes and Academic Attainment, p. 61). The problem of employing personality theory in this regard evidently requires more extensive and subtle methods of research than have been needed to show the values of tests of ability and intelligence in this area.

The basic problem to be studied in this thesis is the manner in which different research designs affect the results obtained in research studies concerned with the relationship between the personality dimension of neuroticism-stability and academic attainment. Just as differing results can be traced to differences in testing instruments, culture, etc., the writer will attempt to show that the same holds true for subtle differences in research design. A review of existing literature, as well as the results of the pilot and main study reported in this paper, will be looked at from this point of view.

Historical Account of Personality Research

In The Structure of Human Personality, H.J. Eysenck (1960) bemoans the failures of many researchers in the area of personality and delivers a direct appeal for a return to strict empirical methods which advocate the use of factor analysis as the major research instrument.

We have seen time and time again how the attractive hypotheses of even the most eminent psychologists were shown to be lacking in factual foundation, and it is clear that much greater care should be exercised by psychologists in postulating the existence of personality traits. Before such claims can be taken seriously, some form of factor analytic demonstration should be undertaken to prove that the trait in question has some degree of functional unity in terms of the measures suggested for the purpose of its assessment. When this is not done, we have the absurd situation that a given trait, such as rigidity, or intolerance of ambiguity . . . is mentioned by ten different tests, none of which intercorrelated significantly with any of the others. Clearly, the confusion which arises from such unwarranted postulation of traits and trait measures, in the absence of adequate proof, reduces the whole field of personality study to complete chaos (pp. 43, 44).

In the opinion of the present author, one of the major promises of finding any order in the realm of personality, and more specifically in the area of personality and academic performance lies in the patient, painstaking work of such rigid empiricists as the Guilfords, H.J. Eysenck, and Raymond B. Cattell.

The work of Guilford and Guilford (1934, 1936, 1939) was the first ambitious attempt to analyse correlations between "item" responses on personality questionnaires with the aim of locating clusters of responses which could then be examined in an attempt to determine the tendencies which they represent. This approach contrasted sharply with previous studies (Willoughby, 1932; Perry, 1934; Flanagan, 1935; and Vernon, 1938) which had attempted to make use of correlations between existing "scales" which were assumed to be separate measures of extraversion, ascendance, self-sufficiency, depression etc. in the hope of discovering either more parsimonious ways of arranging and scoring the tests, or of discovering more fundamentally, meaningful psychological variables. As Eysenck has pointed out, it was just this kind of approach that linked chaos with personality study.

Thus, when J.P. and R.B. Guilford ran correlations, not between scores on clusters of items selected on "a priori" grounds, but between individual items themselves, it opened up an entirely new and important field of investigation. The first factor analyses of inter-item

correlations made by Guilford and Guilford (1934, 1936, 1939) and Martin (1943) identified thirteen differentiable personality traits. Lovell (1945) factor-analyzed the correlations between total scores on these thirteen personality variables and came up with four so-called "super-factors" which seemed to account for most of the relationships identifiable with the thirteen Guilford traits. Another analysis of the Guilford data by L.L. Thurstone(1951) produced seven major factors in place of the original thirteen.

In order to shed new light upon the question of how many independent factors were represented in this comprehensive set of personality items, J.P. Guilford returned to the fray in 1956 along with Zimmerman. Using Lovell's sample of 126 men and 87 women they ran a new factor analysis on the items contained in 70 little tests (two-eight items each, three variables for each of the original three factors and sex) and found clear evidence for 14 separate factors which they incorporated in the Guilford - Zimmerman Temperament Survey.

Eysenck (1960) summarizes J.P. Guilford's work by saying:

On the whole, Guilford's contribution insofar as questionnaire responses can be admitted as evidence in the analysis of the organization of personality, was to throw light upon the principles of organization at the trait-level, and to show that higher-order constructs emerging from the intercorrelation of these items confirm to a remarkable extent the results obtained by previous rating studies (The Structure of Human Personality, p. 103).

To interpret this excerpt, it must be recalled that Eysenck looks at personality from four levels of behavior organization - specific responses, habitual responses, traits, and types. At the third level habitual acts are organized into general types. Eysenck thus sees both type and trait as defined in terms of a pattern of intercorrelations. For example, persistence, rigidity, subjectivity, and various other traits would form a constellation of traits intercorrelating amongst themselves, thus giving rise to a higher-order construct, the type. Questions of continuity or distribution are seen to be irrelevant to the distinction made between type and trait. It is merely in terms of their inclusiveness that they differ.

Cattell agrees that description by trait and description by type are not opposed systems. However, he prefers to throw out the ambiguous word type and employ the terms surface trait and source trait since they better correspond to statistical formulations. In Cattell's (1946) own words:

The psychiatrists' syndrome or type is essentially a correlation cluster or surface trait (except in the rare case where species type patterns exist). Consequently, since surface trait and source trait better correspond to statistical formulations, the ambiguous term "type" is superfluous and we may best proceed to the measurement of personality in terms of surface traits and source traits (Description and Measurement of Personality, p. 14).

In 1956, Eysenck carried out extensive item analyses and factor analyses of Guilford's scales in an effort to improve the validity and reliability of these scales for the measurement of neuroticism and extraversion. Two new scales

were constructed consisting of twenty-four items each. Two shorter scales (Eysenck, 1958) of six items each were also constructed for certain purposes where length and time are restricted. The final scales resulting from this work were published under the title Maudsley Personality Inventory (Eysenck, 1959).

Much of the value of Eysenck's work comes from his careful validation of his two main scales and from his painstaking delineations of the introverted, extraverted, and neurotic types. Eysenck has developed a procedure termed "criterion analysis" to supplement the factor analysis of correlations between personality test scores and to obtain evidence as to what the factors represent. For example, with regard to neuroticism, after showing that the tests which come out with the highest loadings on the first most general factor based on individual differences in normal nonpsychiatric subjects are the same tests that most clearly differentiate neurotic patients from people in general, he concludes that this particular set of tests measures a continuous variable which can reasonably be called "neuroticism" even in normal people. The scales most frequently used in these studies have been the Maudsley Personality Inventory (Eysenck, 1959) the Cattell Personality Inventory (Cattell, 1957), and the Eysenck Personality Inventory (Eysenck and Eysenck, 1963).

The work of R.B. Cattell, as reported in numerous journal articles and several books, is also among the most

ambitious attempts made to combine factor analyses of ratings, questionnaires, and objective tests into an organized whole and to integrate the results with non-mathematical classifications of personality. The overall plan of his research program has been to identify basic factors from separate studies based on ratings, questionnaires, and objective tests, and then to apply all three methods to a single group in order to determine whether the same factors would show up for all three.

Cattell began his program with ratings. In an ingenious manner he succeeded in solving the continuing problem in personality study of "what to rate". By taking a list of trait names from the Allport and Odbert (1936) dictionary and adding to it names from psychiatric and psychological literature, he compiled a list of 171 characteristics. This number was reduced to 35 by a method of multivariate analysis which consisted of intercorrelating the ratings obtained for 100 adults on each of the 171 characteristics, and then grouping the traits into clusters by putting together those that correlated more than .45 with each other. Finally, a factor analysis was carried out on the correlation ratings of the thirty-five variables for 208 male adults. The twelve factors emerging from this analysis are reported fully in Cattell's 1946 book. During the period from 1947 to 1950 the studies using rating methods were replicated on different samples (Cattell, 1947, 1948, 1950).

The next phase in the Cattell research program was

the beginning of an attempt to match up factors obtained from questionnaires and from objective tests to see whether they corresponded to the factors based on ratings (Cattell and Saunders, 1950). In The Meaning and Measurement of Neuroticism and Anxiety (Cattell and Scheier, 1961a) an excellent summary of the developments in this area is given.

The separate factor analysis of L (ratings) and Q (questionnaire) data realms has consistently yielded about sixteen factors in each medium, all but a few of which can be matched by actual correlation from L to Q data . . . There are at least eighteen objective-test factors, four of which are quite confidently identifiable with four groups of rating and questionnaire factors. Most of the sixteen dimensions in L and Q data are substantially involved in one or the other of these four groups. It follows that the unmatched, left-over objective-test dimensions must penetrate to realms of normal personality never before glimpsed in the ratings and questionnaires on which clinical psychology has traditionally depended (pp. 155, 156).

As is evident from this passage, each successive research undertaking has served to add some new factors to the previous list of twelve and to modify the description of what each dimension signifies about personality. It is the questionnaire approach which has been emphasized in more recent work. The testing instrument used to provide comprehensive personality coverage in this regard has been the 16 Personality Factor or 16 P.F. test (Cattell and Eber, 1957) which measures sixteen distinct dimensions of personality. In a concise form, this test has been demonstrated to provide the essential information previously available only after using four to five thousand items, representing an exhaustive list of all questionings employed

by psychologists in assessing personality. With the development of similar personality questionnaires for high school students and younger children (R.B. Cattell and Gruen, 1954; R.B. Cattell, Beloff, and Coan, 1958) as well as more specific questionnaire derivatives of the 16 P.F. test (Cattell and Scheier, 1961b, 1963), this system of organizing variables has been made available for many kinds of research and application.

Any disagreement between Eysenck and Cattell in their factor analytic studies is a methodological one relating to the number of factors to be extracted. Eysenck's major contribution in this area was made during the early post war years when most British factor-analysts were still suspicious of Thurstone's notions of oblique factors and of rotating to simple structure. Centroid factors account for decreasing amount of variance as further factors are taken out, so rotation dictates the extraction of few factors. In his original research, Eysenck (1947) played safe and concentrated on two factors although he took out four. These were general neuroticism and hysteria-dysthymia and accounted for 14 percent and 12 percent of the variance, respectively. By contrast, Cattell (1946) took out twelve factors accounting for 40 percent of the variance. Later research, as already mentioned, adds four more factors.

What is at stake here is not a simple matter of how many factors should be extracted, it is rather the matter

of rotation. If we are to interpret centroid factors, the ones we omit to extract will almost certainly be of less importance than the ones we have extracted, but if we are dealing with simple-structure factors, stopping the factor analysis too soon will distort the rotated factors. Cattell must take out all significant factors. Eysenck may stop at any stage he chooses.

Cattell's method allows for finer statistical implications which throw fuller light on the complex causal relations involved. Cattell has been concerned with introducing greater precision into his factorial approach. Eysenck, on the other hand has preferred to use factor analysis only as an introductory tool whose products then require shaping with finer instruments. Much of his current work is concerned with this type of development. For him, the stress is upon the hypothetico-deductive method in which factor analysis plays a part but requires to be integrated with other studies of a more causal nature.

Insofar as the centroid factor takes out at each stage, what is most general to the matrix, we should find that the first few centroid factors are likely to be influenced largely by the second-order factors. This seems to be, in fact the case.

In fact, Eysenck (1960) in the second edition of The Structure of Human Personality notes that the two main second order factors emerging from Cattell's L data are

neuroticism and extraversion. In other words, the two centroid factors of Eysenck correspond to the two largest second-order factors of Cattell. The latter calls them anxiety and extraversion. The relationship between anxiety and neuroticism seems obvious enough. Further, Eysenck observes that the same is true in Cattell's second-order factor analyses of his Q data; here also neuroticism and extraversion are the two main factors and they are suitably matched with those emerging from L data. These measures also correlate reasonably highly with the neuroticism measures of the M.P.I. (Eysenck, 1959) derived from Guilford's work. Cattell himself, in his 1957 volume, indicates how his correlated first-order factors may be reduced to a few factors of the second-order.

From this, it is readily seen that the research of J.P. Guilford, H.J. Eysenck, and R.B. Cattell does not suffer from the same disorder, confusion, and chaos that Eysenck observes to be true of many factorial studies of personality traits. While the criticism that factor analysis yields different results for different practitioners, and is unreliable in the sense of failing to produce agreed results, is valid with regard to studies of the type alluded to in the quotation from Eysenck, it certainly carries no weight in reference to the rigid empirical work of the three theorists in question. Whatever may have been true twenty or thirty years ago, there can be no doubt that nowadays there is comparatively little disagreement, at least between the major investigators, in the field of personality theory based

on the use of the concept of trait and the use of questionnaire inventories.

In addition to the agreement of Guilford, Eysenck, and Cattell; factor analysis of a variety of questionnaires such as the MMPI (Kasselbaum et. al., 1959), the Gough California Personality Inventory (Mitchell and Peirce-Jones, 1960; Nicholls and Schnell, 1963), and the Murray List of Needs (Stern, 1962) results in factors very closely resembling Eysenck's factors of neuroticism and extraversion.

Further validation of the factors obtained from the questionnaire approach to personality study has been provided by controlled laboratory tests (Cattell and Scheier, 1961a; Eysenck and Rachman, 1965) and by Interaction Process Analysis (Bales, 1970).*

Thus, due to the careful work of serious researchers in the area of personality, a firm foundation has been laid upon which future research can rest. By making use of, expanding, and advancing the rigid methodology which has characterized the work of these scientists, results of future studies may well be more readily comparable than has previously been the case. In the area of personality as

* It is because of the similarities between these various personality inventories that Cattell and Scheier's Neuroticism Scale Questionnaire was chosen as the sole testing instrument to be used in the present study. In view of practical limitation, the choice of one test necessitated a shorter testing time, and as a result permitted a larger sample to be tested.

related to academic achievement these more extensive and subtle methods of definition and research technique may well hold the key for resolving many of the contradictions and discrepancies which still abound in the literature.

Although the present study is essentially empirical in nature, it might be helpful to review briefly the theoretical side of the question of neuroticism and academic attainment. In this manner, the reader will hopefully develop some insight into why one might or might not expect that these two factors would be related. There are almost as many different theoretical formulations which relate to the area of neuroticism and academic attainment as there are research studies in the area. The contributions of D.O. Hebb (1955), H.J. Eysenck (1957), and I.G. Sarason (1960) will be briefly outlined.

Hebb (1955), while looking at the problem of motivation from a neurological point of view, considers the relation of the effectiveness of cue function, actual or potential, to the level of arousal. Physiologically, he assumes that cortical synaptic function is facilitated by the diffuse bombardment of the arousal system. When this bombardment is at a low level an increase will tend to strengthen or maintain the concurrent cortical activity; when arousal or drive is at a low level, that is, a response that produces increased stimulation and greater arousal will tend to be repeated. But when arousal is at a high level, the greater bombardment may interfere with the delicate adjustments

involved in cue function, perhaps by facilitating irrelevant responses. Thus, Hebb proposes an optimum level of arousal for effective behavior. He is one of the first motivation theorists to postulate that medium levels of cue function and arousal will result in optimal levels of response and learning.

Eysenck (1957) identifies his personality dimension of neuroticism with autonomic drive. If Eysenck's theory is accepted, one might expect a positive linear relationship between educational attainment and neuroticism, with high achievers scoring high on neuroticism. However, such hypotheses do not seem to take into account the Hebbian notion that when very high levels of arousal or drive are operating, interference may result which would have a detrimental effect upon learning and achievement.

The interference potential of drives such as anxiety has been taken up very strongly by I.G. Sarason (1960). In summarizing many studies in the area of anxiety and learning, he concludes that the performance of high test-anxious individuals seems to be more disrupted by high motivational or personally threatening conditions than is the performance of other individuals in the test-anxiety score distribution. Under neutral or reassuring conditions, performance differences disappear. (It should be noted that Sarason deals with "state" anxiety, which is quite different from "trait-anxiety").

From this brief discussion, I think it can be seen that theories of drive and motivation may be interpreted in many

different ways to produce many varying hypotheses. It is not the intent of this thesis to approach the question of neuroticism - achievement from a theoretical vent, but rather, from a strictly empirical one. Nevertheless, the reader should be aware that good scientific hypotheses are most often firmly rooted in sound scientific theory.

Survey of the Literature on Personality and Academic Attainment

In view of what has been said regarding the difficulty in comparing various studies concerned with finding relationships between personality variables and school achievement, the writer does not propose to give an extended summary of all the studies in this area. To do so would be an extremely difficult and rather unrewarding task. Rather, it will be the aim of this section to survey mainly those studies which, because of their common use of the questionnaire scales developed by Cattell and Eysenck can be readily compared with some precision.

The main research to be dealt with is that which is concerned with the personality dimension of neuroticism-stability and its relationship to school performance. Since anxiety is a major component of neuroticism as delineated by Eysenck and Cattell, a summary of thirty American studies of the relationship between anxiety and school achievement found in an article by F.W. Warburton (1962) is relevant to the present discussion:

TABLE 1

Anxiety vs. School Achievement	Number of Results
Significant negative correlation	13
Non-significant negative correlation	15
Zero correlation	1
Significant positive correlation	<u>1</u>
	30

Warburton states that in 93% of the studies anxiety is related to poor achievement. On the whole, the weight of American evidence suggests that anxiety is detrimental to academic achievement.

Two British research-workers, Furneaux (1956) and Lynn (1957, 1959) provide exceptions to this rule. Furneaux has shown that British students who do well at University (Oxford in this case) score more highly on neuroticism. Lynn has found a positive correlation between anxiety, introversion, and attainment in Advanced Level examinations, and that university students score more highly in neuroticism than other young people. In 1962, Furneaux reported that a group of neurotic introverts had the lowest failure rate in examinations at a university level. Kelvin and his co-workers (1965) confirmed the superiority of the neurotic introverts in this regard, but found that a group of student failures tended to be neurotic extraverts. The work and

ideas of Lynn and Furneaux will be discussed later in connection with research problems and interpretation of the results obtained in the present research.

Lynn and Gordon (1961) working with male university students report a positive correlation between neuroticism as measured by the Maudsley Personality Inventory and size of vocabulary. They also report a curvilinear relation between neuroticism and score on Raven's matrices, subjects in the middle range of neuroticism doing best. Lynn and Gordon conclude by saying that neuroticism appears advantageous to school achievement because of its relationship to size of vocabulary and probably to conditionability, and also because in normal groups, subjects scoring neurotic tend to be quicker. The optimum level of neuroticism for academic performance appeared to be in the region of half a standard deviation above the national average.

The results of four studies using Cattell questionnaires published in 1960, provide information that is somewhat at odds with most of the data alluded to in the preceeding paragraphs.

Ballham (1960) gave 103 secondary modern school children, aged 12-15, Cattell's High School Personality Questionnaire and correlated this with tests of intelligence and school marks in English and Arithmetic. His results suggested the possibility that stability is a factor in all scholastic success, and that extraversion with its outgoing quality may make an additional contribution to English achievement. Thus

Ballham found no support for Lynn's theory that the neurotic introvert is superior in academic achievement.

Butcher and Gorsuch (1960) using Cattell's questionnaires examined differences between urban and rural children. They found that in the case of six primary personality factors urban children scored in the "anxious" direction as compared with the rural children. Such observations are common enough in literature and conversation, but had previously lacked scientific support.

Warburton and Hadley (1960) studied students in training college courses at Manchester University and State Teacher's College, Indiana, respectively, with a total population of 300 students. Holmes (1960) studied 350 college undergraduates at Illinois Wesleyan University. The overall findings from these researches clearly associate scholastic achievement with stability and in particular with the primary factors of perseverance (G+) and will-control (Q3+). In not one of the tested groups was anxiety or a surface trait of neuroticism associated with scholastic success.

Cattell and Butcher (1968) in their joint publication, The Predication of Achievement and Creativity, report in detail the results of a survey of 277 Illinois students both rural (Paxton) and urban (Springfield). This survey is actually a part of a larger study by Butcher, Ainsworth, and Nesbitt (1963) which included both American and British children of ages 12-14. All the children were tested with Cattell's HSPQ and their mean scores were compared on

fourteen personality factors and two second-order factors (extraversion and anxiety). Criteria for measuring achievement consisted of the Stanford Intermediate Achievement Test, Form X, and teacher ratings for the American sample; while the results of annual internal school examinations in English, mathematics, history, geography, science, and art with provision for standardized marking were used for the British sample.

Significant differences between the American and British samples were found on a number of factors, and in particular, the British children were found to be less sociable, more assertive, and less conscientious. The pattern of prediction of school achievement was compared and the same factors were generally found to be related to school achievement in both countries.

Butcher et. al. report that superego strength, G, (conscientiousness) and Q₂ (self-sufficiency) correlated fairly consistently with school success for both samples. A (affectothymia, sociability) was the next most consistent predictor for the American sample.

Cattell and Butcher, in their independent analysis of the American data, found that the six factors that yielded the highest correlations with the various achievement measures were G, Q₂, E- (submissiveness, A, Q₃ (self-sentiment strength), and D- (phlegmatic temperament). I- (tough - mindedness) was found to be more prominent as a predictor of success of the Stanford subtests in the rural

(Paxton) sample.

In 1964, Dennis Child, studying 138 children from an urban comprehensive school and 40 children from a boys public school, found that stability as measured by the Junior Maudsley Personality Inventory was related to high achievement on terminal examination results.

Cattell, Sealy, and Sweney (1966), in a major research into the prediction of school attainment from intelligence, motivation, and personality measures, used the HSPQ as their personality measure. The associations found between personality traits and achievement were very similar to those reported in the Burcher et. al. (1963) study with the exception that Q_2 (self-sufficiency) was not found to correlate.

Rushton (1968), using Cattell's Children's Personality Questionnaire, found that the second-order factors of anxiety and neuroticism correlated negatively with verbal reasoning and school record based on teacher ratings of ability.

Another study done in 1968 was that by N.J. Entwistle and Shirley Cunningham. This was a follow-up study of 2,995 Aberdeen children aged about 13 years. The Junior Eysenck Personality Inventory was used along with teachers' average rank order in class, scaled on a verbal reasoning test. The relationships between attainment and the personality dimensions of neuroticism and extraversion were examined. Evidence was that the relationship between stability and

attainment is positive and linear.

22.

In way of summary, although the findings of research studies which point to a positive relationship between neuroticism and academic attainment are in a minority to those findings which propose the converse, it is exceedingly difficult to find a rational basis for determining the worth of individual studies. Some factors which might be considered in order to aid in assessing the relative merit of each research alluded to in this paper might be research design, nature of sample, and achievement criterion used. When the research studies are categorized according to culture of sample, educational level of sample, or achievement criterion, no enlightening pattern presents itself. For example, conflicting results are found amongst studies done solely with British subjects, solely with university students as sample members, or amongst studies which depend entirely upon teacher ratings as achievement criterion.

Only when research design was considered did any kind of consistent pattern seem to evolve. If the studies of Lynn (1959), Furneaux (1956, 1962), and Kelvin (1965) are considered (It will be recalled that these studies all reported a positive relationship between neuroticism and school success), one striking similarity becomes evident with regard to their research designs.

This common factor has to do with the nature of the sample studied. In all these studies the sample used was not of a relatively random nature, as was the case in the

other studies referred to. Rather, the samples consisted of groups of successful students, usually on the basis of school examination results. The possibility then presents itself that the relationship between neuroticism and academic attainment might vary as attainment level itself varies. At any rate there seems to be a difference between saying that successful students are neurotically inclined, and that neuroticism is positively related to academic attainment for all students. Indeed, in view of other research in the area this kind of generalizing seems not to stand up.

If the literary review presented in this chapter is reviewed in this manner, most discrepancies seem to disappear. Indeed, it is impossible to expect that the answers to two quite different research questions - i.e. "What is the general relationship between neuroticism and academic attainment for all students?" and "What is the relationship between neuroticism and academic attainment for successful students?" - should coincide exactly.

Problems and Hypotheses

While the careful work of research workers such as Sweney and Sealy in America, and Butcher and Warburton in Britain, all of whom have made use of Eysenck and Cattell's detailed and exacting formulations, has, in recent years, added greatly to our knowledge of the predictability of school performance from personality variables, and the exact relationships existing between the two; many questions

remain unanswered. An acute need exists to replicate surveys of the kind described in the foregoing section, not only on similar samples, but in different kinds of schools and in other countries and cultures. Even in light of what has been said at the end of the preceding section, it is possible that the extent to which measurable personality variables are related to academic attainment differs according to differing environmental circumstances.

Further, level of difficulty of material, and the stage of education reached may be very important factors. Sex differences, differences in parental drive, varying effects against different achievement criteria, and the possibility of non-linear relations between variables are other problems. Clearly, much more remains to be known about the relationship of personality variables such as neuroticism to academic attainment.

The purpose of the present research is to provide information which, considered in conjunction with other recent studies based on Eysenck and Cattell questionnaires, may shed light on these problem areas. Cattell and Eysenck have provided the instruments for an enlightened inquiry into these questions, and it is only through an accumulation of studies on differing age groups, cultures, and environments that more clearly defined answers can be formulated and some of the discrepancies in the literature eliminated.

The hypotheses relevant to the present study are drawn from the problems listed in the preceding paragraph. (1) For

a Canadian sample of high school students, is neuroticism negatively related to school attainment? (2) Is the relationship non-linear? (3) Are there any sex, rural-urban, or matriculation - non-matriculation, differences in this relationship? (4) Is there a significant pattern of neuroticism (on the basis of a breakdown into primary personality dimensions) which typifies scholastic attainment or lack of it?

The answers to these questions should also provide further information concerning the validity of the assertion that type of research design is an important factor in determining the results of studies in this area. It should be remembered that this is the major concern of the present thesis, and that all results and findings should be considered with regard to this basic problem.

CHAPTER 2

Testing Instruments

General Discussion of Questionnaire Testing

Before turning the discussion to a consideration of the merits of the testing instruments used in the present study, it is reasonable to consider the merits and demerits of questionnaire testing in general.

Various objections have been made to the use of objective tests in the analysis of personality; and the approach to personality by "atomization" into isolated traits or variables is often called into doubt. One objection is that this method is static and gives little account of the dynamics of behavior. This is true in the sense that any particular piece of behavior depends on such a multiplicity of factors in the personality, and in the environment, that no one ever reacts in accordance with a single trait. But this does not mean that it is reasonable to ignore the results of vast researches simply by calling them static. In fact there is a great deal of life in the categories proposed by Cattell, by Eysenck, and by Guilford; and an account of an individual's personality and behavior solely in terms of Cattell's traits, given by a person who is fully acquainted with their

use, by no means presents an unmoving picture of the situation.

Another frequent objection is that objective questionnaire testing neglects the situational determinants of behavior - assuming that, for example, the same child displays the same characteristics at home, at play, and in school classes under different teachers. It is true, of course, that differences between the behavior of the same child on different occasions lessen the overall value of tests. But this objection merely underlines the important fact that in establishing external validities, a large number of separate validity studies should be made to demonstrate consistency of trait patterns. On the other hand, the influence of situation can be much exaggerated. There is obviously a need for large scale investigations into the influence of different situations on personality test scores. But it cannot reasonably be doubted that there is some constancy underlying the diversity in human behavior.

It has been claimed that trait theories are poor working philosophies for those who attempt to predict, control, and alter behavior: this is true if traits are conceived as relatively inflexible characteristics of the person. It would seem that the aim of science is not however, to provide comforting philosophies, but rather to reveal facts. This implies that at some (early) stage we abandon the philosophical armchair and engage in the field of action with the empirical realities. Scientific method

is a self-correcting process.

Eysenck (1947) in Dimensions of Personality reminds those who would criticize questionnaires on the grounds that their extreme "subjectivity" makes it impossible to rely on individual responses as being truthful, that if we look at the behavioral act of underlining "Yes" rather than "No", without drawing any conclusions as to the correctness of the response for any individual, we are dealing with a purely objective type of response. As for making interpretations concerning test results, Eysenck points out that:

If we are dealing with two groups the differences between which are not established in any objective fashion, then the fact that these results can be shown to differ significantly on a questionnaire, in itself establishes the fact that the two groups are different ... If in addition we can interpret the observed results on the questionnaire, so much the better; such interpretation, however, is by no means necessary in order to establish the systematic value of the questionnaire study (Dimensions of Personality, pp. 59, 60).

The Problem of Neuroticism and Anxiety in Relation to Cattell and Eysenck Questionnaires

In order to better understand the nature of the personality questionnaire chosen for use in the present study, it would probably be helpful to look at what is meant by neuroticism and anxiety in relation to Cattell and Eysenck, and to look more closely at the value of multi-variate analysis in this connection.

There has been and continues to be much controversy

in psychiatric circles regarding the nature of neurosis; whether it is a pathological variant as differentiated from a product of heredity or of environment, whether it is unifactorial or multifactorial, and so forth. Regarding the abnormal associations of neuroticism, Cattell (1946) states: "Abnormal behavior is a rather artificially - legally, and socially - cut-off portion of the total behavior studied under personality, and it is of practical value to study it, as such, only when it presents an especially advantageous avenue to the understanding of personality" (Description and Measurement of Personality, p. 46).

Rather than becoming involved in an endless dispute over psychiatric and psychological terminology, Eysenck and Cattell have, through a system of criterion analysis, operationally defined neuroticism in the following manner. After showing that the tests which come out with highest loadings on a certain factor or certain factors based on individual differences in non-psychiatric subjects are the same tests that most clearly differentiate neurotic patients from people in general, they conclude that this particular set of tests measures a continuous variable which can reasonably be called "neuroticism"; and that this term can be used even in referring to non-hospitalized, or "normal" people. The normals differ from the patients not in an absolute, qualitative way, but by having less of the traits the tests measure. The trait measures from

a continuum in the same way as do intelligence test scores.*

The point of departure between Eysenck and Cattell concerning the nature of neuroticism involves the "unifactor" or "multifactorial" nature of the variable. Cattell and Scheier (1961a) state very definitely that "neither in terms of first-order nor second-order factors do neurotics differ significantly from normals on any one central factor of neuroticism". This stands in contrast to the essentially unifactor conclusions of Eysenck who sees a single factor of neuroticism as incorporating many of what had been referred to in the past as factors of emotionality or unstableness.

However, it has already been noted that Eysenck views the main second-order factors emerging from an analysis of Cattell's L data as being comparable to his factors of neuroticism and extraversion. Further, the mere fact that a factor is considered to be a unity does not necessitate the absence of subsidiary group factors. Intelligence is considered by some to be a unitary factor, but in addition a number of group factors such as verbal ability, visuo-spatial ability, arithmetical ability, and so forth are recognized. The disagreement here seems to be more a matter of format than conception: indeed analyses of both

* It should be noted that Cattell made greater use of clinical assessments throughout his work than did Eysenck. Clinical assessments and ratings provided a good deal of information which Cattell incorporated into his factor analyses.

Eysenck's and Cattell's scales show a remarkable similarity in their operational definitions of neuroticism.

The methods of multivariate research and criterion analysis used by research workers such as Cattell and Eysenck have helped to answer two important and bothersome problems which have confronted workers in the field of neuroticism. Firstly, it has become clear that the tendency toward neurosis is distinctly separate from the tendency toward psychosis. On the basis of this work, neurotic and psychotic tendencies are two completely different dimensions of personality, both being continuous with traits existing in normal people.

Secondly, in Cattell's work a clear distinction has finally been drawn between neuroticism and anxiety. Anxiety is seen as an important factor in the neurotic constitution, but it is made very clear that the two variables are in no way synonymous. Much of the confusion over this question in previous studies is thus disposed of. This distinction will become clearer with a look at the purpose, design, and construction of the personality questionnaire, which is used in the present research - Cattell and Scheier's Neuroticism Scale Questionnaire (1961b).

The Neuroticism Scale Questionnaire

The Neuroticism Scale Questionnaire (NSQ) was developed as an integral part of a series of questionnaires produced as a result of the IPAT (Institute for Personality

and Ability Testing in Illinois, U.S.A.) plan to provide basic measures for various factored personality variables. The NSQ is a brief, standard, easily administered and scored inventory measuring degree of neuroticism or "neurotic trend". It is suitable for normal and abnormal adults and adolescents. In selecting the dimensions chosen to represent neurosis in the NSQ, the scores for 213 clinically - judged neurotics were compared with the scores for normals on each of the sixteen dimensions measured by Cattell's 16 Personality Factor Test (Cattell and Scheier, 1961b; Ipat Staff, 1960). The dimensions selected were those six which most significantly discriminated between the neurotics and normals. Since the 16 PF Test picks a maximum of 30 items which best measure each of sixteen personality dimensions comprehensively covering personality, the total pool of neurosis-associated measures became a maximum of 180 items. To this basic pool, 20 items analyzed in recent research were added because they also differentiated very significantly between clinically-judged neurotics and normals and appeared to be somewhat different from any of the items in the basic pool.

From this penultimate pool of 200 items, 40 were finally selected for the NSQ because they:

1. maximally differentiated between neurotics and normals.

TABLE 2

The Neurotic-Associated Personality Factors Measured by the
Neuroticism Scale Questionnaire (NSQ)

(1) Factor I	<u>Overprotection; Tender-Minded, Cultured,</u> <u>Protected Emotional Sensitivity (vs</u> <u>Tough-Mindedness)</u> <u>Depressiveness; Inhibited, Sober,</u> <u>Seriousness (vs Happy-go-lucky</u> <u>Cheerfulness)</u>
(2) Factor F	<u>Submissiveness; Suggestibility,</u> <u>Dependence (vs Dominance)</u>
(3) Factor E	(4) Factor O <u>Worry, Guilt Proneness</u> (vs Assumed Self-Confidence)
Anxiety	(5) Factor Q ₄ <u>Ergic Tension from Frustration</u> (vs Calm Relaxation)
	(6) Factor C <u>Ego Weakness or Immaturity</u> (vs Ego Strength)

2. maximally discriminated amongst degrees of neurotic trend within the normal range.
3. measured selectively one and only one of the components intended in the test.
4. made small vocabulary demands and were highly intelligible.
5. disguised the purpose of the test.

The six personality dimensions which these 40 items measure are listed in Table 2, with Cattell's letter designation at their high-score, neurotic-associated pole, followed in parenthesis by their low-score, opposite-to-neurotic poles.

The last three dimensions listed in Table 2, as indicated, are known to group together in a second-order factor of anxiety (Cattell and Scheier, 1958 and 1963) and the test provides only one separate subscore for these three dimensions - an anxiety score - which becomes the fourth component of the test. Psychiatric and clinical correlations (Cattell and Scheier, 1958 and 1963) show that this anxiety factor-measure conforms to the consensus of clinical judgements as to the nature and level of free anxiety. About half the differences between neurotics and normals (Cattell and Eber, 1957 and 1964) can be accounted for as differences in anxiety level. Thus, anxiety does play a major role in the neurotic constitution, but it is by no means the whole of it - neuroticism and anxiety are distinct phenomena.

The fifth and final score on the NSQ picks up an overall neurotic trend, this score being the equally weighted sum of scores on the four separate subcomponents.

With regard to statistical independence, reliability, and validity; Cattell and Scheier (1961b) report the following:

1. All four components are distinct and statistically virtually independent of one another. (Tender-Mindedness and Depressiveness show a relationship which slightly refutes this statement; however, it is still low enough to make the statement generally acceptable.)

TABLE 3

Pearson Product Moment Correlations Among the Four Components
in the Neuroticism Scale (based on 113 normal adults)

	I	F	E	Anxiety
I	X	.28	.08	.12
F	.28	X	.11	.15
E	.08	.11	X	.13
Anxiety	.12	.15	.13	X

2. The homogeneity (or consistency) coefficients of reliability, except for the slightly lower E component, for these brief subscales are of the order of .60 to .70, which is suitable for work involving discrimination between groups, but not for individual diagnostic work.*

TABLE 4

Reliability Coefficients for the NSQ, Split-Half Consistency Coefficients (based on 300 normal cases)

I	F	E	Anxiety	Total Neurotic Level
.55	.57	.47	.70	.67

3. Concept or construct validities (i.e. correlation of the items in a given scale with the factor, defined

* In The Sixth Mental Measurements Yearbook (Buros, 1965), Kelly, Pauker, and Crites are all very critical of the NSQ on the grounds that the low order of the reliability coefficients (see Table 4) offers little direct evidence to recommend this test for use in individual evaluation. This criticism seems most astonishing since Cattell and Scheier state very plainly (Handbook, p. 10) that the intention of this test is not to discriminate between individuals, but rather to discriminate between groups; and, if used very cautiously, it may provide rough "leads" in diagnosing the individual case.

empirically and factor analytically, which they are designed to measure) were high - I(.74), F(.76), E(.69), Anxiety(.84). These figures are based on a sample of 300 normal cases.

4. To test concrete validity using the main concrete (external) criterion towards which the NSQ test construction was oriented - the ability to discriminate significantly between clinically-chosen neurotics and normals - the NSQ was administered to 102 neurotics and 1,068 normals. The difference was confirmed beyond the .0005 level of significance. The trend for neurotics to have higher total NSQ scores than normals holds for each of the four NSQ components as well as for total score. It also holds for each sex separately, i.e. in comparing female neurotics against female normals only; and male neurotics against male normals only.

The NSQ is thus seen to have the advantage of being brief and as a result easy to administer and score. It not only discriminates between neurotics and normals, but between persons usually classed as normal. Finally, it is rooted firmly in validation research.

Achievement Criteria - The Stanford Achievement Tests

The other tests used in the present research are the English, social studies, science part A, and mathematics part A achievement tests found in the Stanford Achievement

Test - High School Battery Form W for grades 9 to 12 (Gardner et. al., 1965). The high school level of Stanford Achievement Test is an extension of Stanford Achievement Test, which has been used in Grades 1-9 since 1922, the latest edition being published in 1964. The purpose and intended use of the High School Battery is essentially the same as that of the elementary batteries: to test the educational achievements commonly expected of students in a modern comprehensive school. The High School Battery consists of 12 tests (counting parts A and B of the math and science tests as separate tests), four of which, mentioned above, are utilized in this survey.

The content of the 1965 High School Battery was selected according to the dictum "The curriculum should determine the test". In making the test, surveys of textbooks and courses of study, as well as consultation with teachers and subject-matter specialists were used to determine the important aspects of curriculum in each of the various subject areas. Teams of item writers then prepared enough items to construct four forms of each of the 12 tests. From this stage, a repetitive procedure of review, tryout, and revision led to the desired four forms. These were administered in a national tryout to obtain additional information on items that had survived up to that point and to obtain item statistics from a population similar to that to be used in standardization. Validity problems were satisfied by this procedure. Split-half

reliabilities of a high order are reported in the 1965 High School Battery Manual.

Criteria for the final forms of the tests were formulated upon a general principle of maximizing content coverage within practical considerations of administration. With the criterion that each test should measure power rather than speed, and the desire that each operate in as efficient a manner as possible and still provide meaningful results, the content and item statistics for each test of the battery were carefully geared to a 40 minute period. This time-span was deemed practical after consultation with high school teachers and counsellors.

The administration of the test battery for standardization purposes took place between February 22, 1965 and March 15, 1965.

Information as to the exact content of the four tests found in the Stanford High School Battery, which concern us at present, may be obtained by consulting Appendix D.

Preliminary Statement of Research Design

The present research makes use of both the NSQ and the Stanford High School Battery in attempting to answer the problems and hypotheses stated at the end of Chapter 1. Both tests are administered to a sample of 200 high school students in the Province of Alberta, Canada. The results on the tests are then compared by various statistical

analyses to yield the required information.

This type of ex-post-facto research is an invaluable fore-runner to other more sophisticated and specific researches. Although it leaves questions of direction and causality relatively untouched, ex-post-facto research is invaluable in determining if relationships between variables actually do exist.

CHAPTER 3

Ponoka Pilot Study

Problems and Hypotheses

In 1970, the writer carried out a pilot study to the main research to be dealt with in this thesis. The main problem and hypothesis of the pilot study was to determine if there was a relationship between neuroticism and scholastic success. In other words, are students who are very successful in school more neurotic than students who are not as successful?

Method

As is the case in the present research, Cattell and Scheier's Neuroticism Scale Questionnaire was used to measure degree of neurotic tendencies existing in the student sample. Unlike the present study, no objective achievement criterion, in the form of standardized achievement tests, was used to ascertain academic attainment. Rather, high achievers were separated from other students by the fact that their final grade average from the preceeding year was between 80% and 100%. This average encompassed final grades in English, mathematics, science, and social studies.

The tested sample consisted of 30 Grade XI students attending high school at the Ponoka Composite High School in Ponoka, Alberta. These 30 students were selected

randomly from a total population of 80 Grade XI students who had the common past experience of attending both junior and senior high schools in Ponoka. Of the 30 students finally selected, 11 were boys and 19 were girls. On the basis of the achievement criterion used, seven of the 30 students were categorized as high achievers.

After the NSQ questionnaires had been scored in accordance with the carefully formulated instructions in the NSQ Handbook, the scores of the seven high achievers on each of the four NSQ subcomponents as well as their score on total neurotic level, were compared with the corresponding scores of the other 23 students by means of analyses of variance, with two groups.

Results and Brief Discussion

In comparison with the rest of the sample, the high achievers were significantly higher in tender-mindedness (I), submissiveness (E), and total neurotic level (at the 5% level of significance).

The relationship between achievement and submissiveness shown here might be seen as comparable to that found by Butcher et. al. (1963) and Cattell, Sealy, and Sweney (1966). A discrepancy exists between these researches and the results of the pilot study concerning the direction of the relationship on the I variable. Finally, the general finding that overall neurotic level is associated with high achievement supports the work of Lynn (1956, 1969) and

Furneaux (1956), and as such stands at odds, at least on the surface, with the majority of the literature in the area of neuroticism and academic attainment.

From the results of the pilot study, it seems that for successful Alberta high school students in the town of Ponoka, high achievement is associated with neuroticism. Unfortunately, the pilot study does not provide any information as to the exact nature of this relationship (i.e. whether it is linear, curvilinear etc.). In view of the many problems mentioned at the end of Chapter 1, it is plain that many questions are left unanswered by this relatively simplistic research design and statistical analysis employed by the pilot study. However, it is extremely interesting to note that the study, which was concerned solely with high achievers, supported the findings of Lynn (1959), Furneaux (1956, 1962), and Kelvin (1965).

CHAPTER 4

The Ponoka - M.E. Lazerte Study

Hypotheses and Complete Design Statement

The specific hypotheses with which the present research is concerned are once again:

1. For a Canadian sample of high school students, is neuroticism negatively related to school attainment?

2. Is the relationship between neuroticism and academic attainment for this sample non-linear?

3. Are there any sex, rural-urban or matriculation - non-matriculation differences in the nature of any relationship which might be shown to exist.

4. Is there a specific pattern of neuroticism (i.e. of neurotic associated, NSQ, personality dimensions) which more clearly defines the relationship between academic attainment and overall neurotic level.

To test these hypotheses, Cattell and Scheier's Neuroticism Scale Questionnaire and the science part A, mathematics part A, English, and social studies tests found in the Stanford Achievement Test - High School Battery Form W (Gardener et. al., 1965) were administered to a sample of 200 high school students (Grade XI) attending the rural Ponoka Composite High School located in Ponoka, Alberta; and the urban M.E. Lazerte Composite High School situated

in the city of Edmonton, Alberta. Of the 200, 144 students were from Ponoka and 56 were from Edmonton; 102 were boys and 98 were girls.

The Ponoka sample consisted of students enrolled in one of five social science classes (two psychology, one sociology, one social studies, and one English) which were used for the testing purposes. Since the total time required for the testing was roughly 180 minutes or three hours (exactly 40 minutes for each of the four Stanford tests and approximately ten minutes for the NSQ) the testing sessions for each of the five classes took up two eighty-minute periods and part of another period.

At the Lazerte school, two social science classes were tested (one social studies and one sociology). The testing for the social studies class comprised two eighty-minute periods and part of another, while the testing for the sociology class took up four eighty-minute periods and part of another.

All the classes tested in both schools were selected at random from the total number of social science classes available. The small number of the urban sample in comparison with that of the rural sample was the result of the administrative policies of the schools involved.

The use of the Stanford High School Battery as a measure of academic attainment in the present research, as contrasted with the use of school performance records in

the earlier pilot study, was a decision based on the desire that attainment should be measured in an unbiased, objective fashion which would be fair to each of several classes and to each of the individuals involved. Individual differences in teacher evaluation were thus removed as factors affecting the results.

A certain amount of discrepancy existed between the two high schools regarding the content of the social science courses, since the exact content of each Grade XI social science course in the Province of Alberta is left to the discretion of individual instructors. None the less, common knowledge of a particular nature is demanded of all students in the Province, since all students are required to write the same Grade IX and Grade XII departmental examinations which constitute a portion of the final grade awarded to each student at the end of those years. Further, although the exact content of the courses might differ from school to school, or from instructor to instructor, the course contents are required to be of a particular level of difficulty and to assume a certain similar amount of knowledge on the part of the student according to his or her grade level. With this in mind, it seems fair to assume that no student was disadvantaged in his performance on the Stanford tests by content differences, since these tests are not geared to any particular Canadian high school content, but rather, offer a measure of a general level of knowledge at a particular level of education.

Test Administration and Statistical Analyses

Great care was taken by the writer in administering the NSQ and Stanford tests. Individual teachers were not aware of the nature of the tests so that it was impossible for them to skew the results in any way. A written presentation of purpose, instruction, and suggestion was prepared and read by the writer to each of the classes. In this manner, differences in administration from session to session were minimized. (Of course, where questions were asked, they were answered; but this was in the form of clarification rather than further instruction.) The instructions and suggestions given followed those laid down by Gardner et. al. in the Stanford Achievement Test - High School Battery; Manuel, and by Cattell and Scheier in the Neuroticism Scale Questionnaire Handbook. In the case of the NSQ, the nature of the test instrument as a measure of neuroticism was not disclosed nor was the test referred to as a "neurosis" questionnaire.

All tests were collected and marked by the writer with the aid of appropriate scoring keys. The analysis of the data collected in this fashion was performed by the implementation of three computer programs developed by the University of Alberta Division of Educational Research Services. Two analyses of variance programs and one factor analysis program were utilized. Since the testing itself involved more than one session, 28 of the 200 students

involved did not complete the entire battery of tests. However, in doing the analyses, the entire sample was utilized with group means being substituted for missing scores in the 28 cases.

Preliminary Statement of Findings and Conclusions

The first information which was of interest is tabulated in Table 5 and consists of a matrix of Pearson correlations between all but two of the variables on which scores were obtained. (Note that total neurotic level and total achievement are not included since these two variables are composites of the subvariables which are included.)

All four of the achievement subtests are seen to correlate quite highly with each other (1% level of significance). Of equal interest to the intercorrelations between the achievement subtests, are the significant positive and negative correlations shown between the achievement subtests and the NSQ personality variables - i.e. between English and tendermindedness (positive) at the 1% level of significance; and between science and submissiveness (negative) also at the 1% level of significance. Finally, significant positive relationships are seen between the three NSQ personality variables of submissiveness, tender-mindedness, and anxiety (tender-mindedness and submissiveness at the 1% level of significance; tender-mindedness and anxiety, and submissiveness

TABLE 5

Pearson Correlations for Grade 11 Alberta Students
(n = 200)

	English	Mathematics	Social Studies	Science	I	F	E	Anxiety
English	x	.435**	.496**	.420**	.255**	-.039	.099	-.021
Mathematics		x	.498**	.556**	-.041	.105	-.085	-.123
Social Studies			x	.616**	.057	-.014	-.086	-.074
Science				x	-.122	.089	-.210**	-.111
I					x	-.108	.237**	.158*
F						x	.124	.019
E							x	.147*
Anxiety								x

* p .05

** p .01

and anxiety at the 5% level of significance).

The results of the factor analysis carried out on the Pearson Correlations are found in Table 6 below.

Table 6
Results of Factor Analysis

	Factor 1	Factor 2
English	70	43
Mathematics	79	04
Social Studies	83	08
Science	84	17
Tender-mindedness	01	77
Depressiveness	06	06
Submissiveness	-17	66
Anxiety	-19	47
(n = 200)		

Factor 1 is high on all school subjects and seems to be a general achievement factor. Factor 2 groups the three NSQ components of tender-mindedness, submissiveness, and anxiety with English achievement.

In order to clarify the relationships shown from the Pearson correlations between the Stanford achievement tests

and the NSQ variables, and to check these relationships for curvilinearity; the sample of 200 students was broken down into seven groups for each of the NSQ variables and for total neurotic level (the composite test score) on the basis of scores on each of the NSQ variables. One-way analyses of variance were then carried out using the scores on each of the four achievement subtests, as well as a total composite score of achievement, in turn. In this manner, a total of 25 analyses were carried out - five for each set of arbitrary divisions according to the five NSQ scores (I, F, E, anxiety and total neurotic level).

Of these 25 analyses, only two reported any significant relationships. These were found between tender-mindedness and English achievement, and submissiveness and English achievement (See Tables 7 and 8).

On the basis of trend analysis of the group means (i.e. the means of each of the seven arbitrary groups on which the analyses of variance were carried out), the relationship between tender-mindedness and English is seen to be primarily a positive linear one, while the relationship between submissiveness and English is a curvilinear one with both high and low English achievement being associated with submissiveness. No relationship between neuroticism (total neurotic level) and achievement (total, overall achievement) was evident from these analyses.

In order to determine if any relationships exist

Table 7

Analysis of Variance of English Scores for Grade 11 Students
Grouped on Tender-mindedness
(n = 200)

Source	s. s.	m. s.	d. f.	f.	p.
Groups	3,264.74	544.12	6.00	2.65	.017215*
Error	39,666.13	205.52	193.00		

* p .05

Table 8

Analysis of Variance of English Scores for Grade 11 Students
Grouped on Submissiveness
(n = 200)

Source	s. s.	m. s.	d. f.	f.	p.
Groups	3,271.13	545.19	6.100	2.65	.017014*
Error	39,659.75	205.49	193.00		

* p .05

between any of the variables for particular subgroups within the total sample, the next stage in the analysis of the data collected from the 200 high school students, consisted of dividing the total sample according to sex, rural-urban, and matriculation - non-matriculation differences, and carrying out the same series of one-way analyses of variance described in the preceeding paragraphs for each of the six subgroups formed in this way - i.e. males, females, urban students, rural students, matriculation students, and non-matriculation students. The significant results of these analyses are tabulated in Table 9 under each of the six subgroups. The nature of the significant relationships is based on trend analyses of the means of the seven groups on which each analysis of variance was carried out. The description of the curve is limited to the one adjective which best describes it.

Most of the relationships listed in Table 9 are very specific and as such have little (except in some instances) effect on the results of the one-way analyses of variance which employed the entire sample. The interesting finding here is that in none of the subgroups was neuroticism related to achievement in any fashion.

Finally, the data collected from the 200 high school students was subjected to a series of two-way analyses of variance in an attempt to determine the effect of sex,

Table 9

Significant Results of the Analyses of Variance Carried Out on the
Total Sample Divided According to Sex, Rural-urban, and
Matriculation - Non-Matriculation Differences

Subgroups	Significant Relationship	Level of Significance
A <u>Male Students</u> (n = 102)	(1) Positive linear relationship between English and Tender-mindedness	1%
	(2) Quartic relationship between Tender-mindedness and Total Achievement	1%
B <u>Female Students</u> (n = 98)	(1) Quadratic (curvilinear U-shape) relationship between Submissiveness and English	1%
	(2) Quartic relationship between Submissiveness and Total Achievement	5%
C <u>Urban Student</u> (n = 56)	(1) Quartic relationship between Science and Tender-mindedness	5%
	(2) Quartic relationship between Total Achievement and Tender-mindedness	5%
D <u>Rural Student</u> (n = 144)	(1) Cubic relationship between Anxiety and Mathematics	5%
	(2) Quadratic (curvilinear U-shape) relationship between Submissiveness and English	5%

Table 9 Continued

Subgroups	Significant Relationship	Level of Significance
	(3) Negative linear relationship between Science and Submissiveness	1%
	(4) Quadratic relationship (curvilinear - U-shape) between Submissiveness and Total Achievement	1%
	(5) Quadratic relationship between English and Depressiveness (curvilinear - U-shape)	1%
	(1) Cubic relationship between Science and Tender-mindedness	5%
	(2) Quartic relationship between Science and Submissiveness	5%
E <u>Matriculation Students</u> (n = 119)	(1) Quartic relationship between Depressiveness and Total Achievement	5%
F <u>Non-Matriculation Students</u> (n = 81)		

rural-urban, and matriculation - non-matriculation differences on the personality variables measured by the NSQ, and on the various kinds of achievement measured by the Stanford High School Battery.

The significant differences between the sexes found as a result of these analyses are tabulated in Table 10.

Table 10

Significant Results of Two-Way Analyses of
Variance with Regard to Sex Differences*
(n = 200)

Variable	Finding	Level of Significance
Science Achievement	Males higher than females	1%
Social Studies Achievement	Males higher than females	1%
Total Achievement	Males higher than females	5%
Tender-mindedness	Females higher than males	1%
Submissiveness	Females higher than males	1%
Total Neurotic Level	Females higher than males	1%

* Type of Location (i.e. rural-urban differences) was the other factor in the analyses

The significant differences found between matriculation (a program geared to develop students for university training) and non-matriculation students on the NSQ and Stanford variables are tabulated in Table 11.

Table 11

Significant Results of Two-way Analyses of Variance with Regard to Matriculation - Non-Matriculation Differences*
(n = 200)

Variable	Finding	Level of Significance
English Achievement	Matriculation group higher	1%
Mathematics Achievement	Matriculation group higher	1%
Science Achievement	Matriculation group higher	1%
Social Studies Achievement	Matriculation group higher	1%
Total Achievement	Matriculation group higher	1%
Tender-Mindedness	Matriculation group higher	1%

* Type of location (i.e. rural-urban differences) was the other factor in the analyses.

Only one significant discrepancy evolved from the two-way analyses with regard to differences between rural

and urban students. This was the finding that rural students scored, on the average, higher on the Stanford social studies subtest than did their urban counterparts (5% level of significance).

A final significant result from the two-way analyses of variance was that there was an interaction effect between rural-urban and matriculation - non-matriculation differences as they affect social studies achievement (5% level of significance).

With regard to the four hypotheses which the present study was designed to test, the following conclusions can be drawn from the findings:

1. Neuroticism is not related in any way to overall academic attainment for a sample of Canadian high school students.

2. Since no relationship was found, it is not possible to speak of it as being linear or curvilinear.

3. Although sex, rural-urban, and matriculation - non-matriculation differences exist with regard to scores on specific NSQ variables or Stanford achievement tests, and although specific variable relationships vary according to these differences; neuroticism is not related to academic attainment for any of the subgroups formed on the basis of these differences.

4. No relationships were shown to exist between any of the neurotic (NSQ) sub-variables and overall academic

attainment. Evidently no pattern of NSQ sub-variable scores typifies overall academic attainment as measured by the Stanford tests.

While generally speaking, no findings pointed to a relationship between overall academic attainment and any of the NSQ variables, including total neurotic level; some interesting relationships were shown to exist between specific achievement tests and particular NSQ variables - the most important of these being the relationships between submissiveness and English attainment, and tender-mindedness and English attainment.

CHAPTER 5

Discussion of Results

Pearson Correlations

The relatively high correlations amongst all the achievement subtests shown in Table 5 are not surprising; and indeed, findings of a similar nature are common in the literature, since verbal factors of intelligence correlate highly with most tests found in achievement batteries. The correlation between English achievement and tender-mindedness (significant at the 1% level of significance) is certainly of great interest, and has also been specified by the one-way analysis of variance using the entire sample. On the other hand, the finding from the Pearson correlations that science achievement is negatively related to submissiveness at the 1% level of significance has not been borne out by the analysis of variance. Although the same general trend is noticeable from the analyses of variance, the relationship between the variables is not significant to the extent that the Pearson correlation implies.

The correlations between the NSQ variables shown in Table 5 are generally of the same order as those reported by Cattell and Scheier in Table 3 with two notable exceptions - these being that tender-mindedness and submissiveness correlate quite highly, and that tender-mindedness and depressiveness show a slightly negative correlation, both

on the bases of the present findings. It would seem that tender-mindedness and submissiveness tend to be found together amongst Canadian high school students while they do not tend to co-exist to the same extent amongst the sample of normal, American adults upon which Cattell and Scheier(1961b) base their conclusions. Similarly, depressiveness and tender-mindedness show a slightly different relationship with respect to each respective sample. Difference in age (experience) and culture (values, beliefs, and customs) thus present themselves as the most likely sources of the discrepancies between the present study and the data of Cattell and Scheier. Many potentially feasible explanations revolving around philosophical constructs of the Canadian or the American personality might be postulated here, but to do so on the basis of this single shred of evidence is certainly over-reaching the findings of the present study.

Factor Analysis

The factor analysis of the Pearson correlations, found in Table 6, gives a good summary picture of the findings. From this analysis it is seen that none of the NSQ variables are significantly loaded on Factor 1 which seems to be a general achievement factor. Evidently no significant relationship exists between neuroticism and overall academic attainment.

Factor 2, however, tells us that although total neurotic level may be divorced from total achievement level, English

achievement is certainly related to at least three of the NSQ subvariables - anxiety, submissiveness, and tender-mindedness. At this stage, it is very difficult to label Factor 2. More insight into the nature of this factor is provided by the interpretation of the one-way analyses of variance using the entire sample of 200 students.

One-Way Analyses of Variance (n = 200)

The results of the one-way analyses of variance done with the total sample seems to verify the existence of the second factor reported by the factor analysis. It will be recalled from Tables 7 and 8, that the significant relationships found by these analyses were between English achievement and tender-mindedness, and English achievement and submissiveness - the former being shown as primarily positive and linear on the basis of trend analysis, while the latter was seen to be curvilinear with both high and low English achievement being associated with submissiveness. The non-linear form of this latter relationship explains why it is not evident from the Pearson correlation between English achievement and submissiveness.

Before attempting to postulate plausible reasons and explanations for the existence of these relationships it would be advisable to look more closely at what Cattell and Scheier mean by tender-mindedness and by submissiveness.

The person or group with a high score on the tender-

mindfulness component is sensitive and fastidious in the sense that women typically are, as contrasted with men. In fact this dimension has occasionally been called femininity - vs. - masculinity, but actually it is only one aspect of masculinity - femininity and should not be used alone to establish femininity or homosexuality in the male. The I + person tends to be sentimental, kindly, sometimes artistically and otherwise "cultured", often somewhat affected, and imaginative, even to the point of being fanciful. By contrast, the low-score or I - person might be described as unfeeling, a "Philistine" often brusque in manner. He tends to lack artistic interest and sensitivity, inclining to be a practical no-nonsense type, tough, hard, and responsible.

A certain "softness" characterizes the high score (I+) person showing as kindness, gentleness, and helplessness. He is often attention-seeking in purpose, obvious help-seeking devices. By contrast, the low-score person is hard and rugged, self-reliant, independent-minded, responsible, and poised.

Even when tender-minded persons do act on their own behalf, they do so on the basis of sensitive intuition which is often idealistic and impractical (for example, they are careless as regards material things). By contrast, the tough-minded person is practical, even shrewd basing his actions on an objective, logical, and "realistic" evaluation of the evidence rather than on his feelings.

In terms of its contribution to "neuroticism" this is thought to arise because of the tendency of the tender-minded individual to favor unrealistic emotional goals, and to have a greater capacity for emotional suffering (Handbook for the NSQ, p. 23).

In terms of etiology, Cattell and Scheier view a person's position on this dimension as largely a product of his earlier environment. The present hypothesis regarding I being, that it represents over-protection and sheltering from the realities of life, often by an unrealistic, indulgent home education which lacks consistent discipline in emotional education.

Cattell (1957) says that there is a sense in which the I+ person with his culturally cushioned background has a general belief that the world is a much more benign and

restful place than the harric (I-) individual assumes it to be. His Rousseauian beliefs about the natural goodness of man, the lack of necessity for punishment, the objectionableness of government coercion; follow logically from a childhood protected by a veneer of civilization which has never, in his experience, startled him by breaking through. (It is this side of the I dimension which makes it quite akin to Ferguson's (1941) personality factor of religionism.) The harric individual, on the other hand, although less comfortable to be with, is also more dependable in the sense that he feels less entitled to follow his whims, and is more prepared to accept and cope with the reality of an intractable world.

With this information from Cattell and Scheier, it is quite tempting at first glance, to explain the positive linear relationship found between English achievement and tender-mindedness for the sample of Grade 11 Alberta high school students, by drawing stereo-typed implications about the artistic temperaments of great writers throughout history. Many of these individuals were popularly characterized by the same neurotic-like sensitivity which characterizes the intuitive, delicately imaginative, tender-minded person.

Although offering an hypothesis which may have some validity, such a suggestion really has little value since no carefully documented research into the personality make-ups of great writers has been carried out. Further, the sample of students tested by the Stanford English subtest was not

being tested on creative writing ability; but rather on grammatical exactness, sentence construction, and paragraph organization. The last two of these testing criteria certainly have something to do with creative writing ability; but just how much is not known. It seems that although the suggestion that artistic talent and tender-mindedness seem to coincide may have certain merit, it is not possible to establish such a connection on the basis of existing information.

A more viable explanation of the relationship between I and English achievement might be found in a consideration of the interests of the I+ as contrasted with the I-individual. The artistic interests of the tender-minded individual would no doubt manifest themselves in a penchant for reading which would cater to his somewhat affected, fanciful imagination. While the harder, more rugged I-individual is engaged in athletics and various kinds of physical activity in general, the I+ individual is escaping the hard, practical realities of life through a novel or short story. A good ability to spell, capitalize, punctuate, and to construct sentences and paragraphs would be a natural by-product of this activity simply because of exposure to, and familiarity with the English language. This would explain why no similar relationships were found to exist between tender-mindedness and achievement in other subject areas. In science, mathematics, and social studies, exacting factual knowledge was tested. The advantages of extra-

curricular reading do not lend themselves so readily to this type of knowledge. Further, if reading were to be of value here, it would have to be of a specific, confined, reality-based type which is not likely to attract the I+ personality.

With the hope of shedding some light on the non-linear relationship found to exist between submissiveness and English achievement, Cattell and Scheier's exact conception of the personality dimension of submissiveness should be reviewed as was the procedure for tender-mindedness.

The person with a high score on the NSQ component of submissiveness is obedient, complaisant, dependent - a milk-toast type who lacks the drive to win ("will power") and does not assert himself. (It should be understood that the direction of scoring components E and F is reversed between the NSQ and 16 PF Test. In the 16 PF higher scores on these two components mean dominance and surgency. The meaning of the components is the same in NSQ and 16 PF; it is only the arbitrary scoring conventions which differ between them. If not excessive, these characteristics may be acceptable or even desirable, at least from the point of view of persons in authority and/or at the dominant side of the scale. Cattell and Scheier go on to say that the submissive person is meek, doesn't make trouble, modest, quiet, retiring, tactful, "not defensive", in general not demanding attention, ready to concede the centre of the stage to others rather than argue or clash with them, and sensitive to social approval or disapproval. In this sense, the submissive

person's behavior may appear quite considerate, kindly, and soft-hearted, probably mainly because he fears and avoids the clashes which would result from assertive-hostile behavior towards others. If there are unavoidable conflicts with others, or any form of social disapproval, he is profoundly upset.

The person with a low score on this NSQ component is dominant, assertive, ascendant, aggressive, and competitive, even pugnacious. He tends to be domineering, unshakeable in his determination to have things his own way, vigorous, forceful, decisive, tough, and stern. He is independent minded, willful, stubborn, and self-assured often to the point of being boastful and haughty. He seeks attention but is relatively insensitive to social approval or disapproval of his behavior.

The Factor E dimension appears to involve differences in the expression of hostility (rather than the amount, i.e. the presence vs. absence of hostility); the submissive pole is intro-punitive (covert hostility against oneself) and the dominant pole is "extra-punitive" (hostility against others). Both poles are found to be associated with maladjustment - the submissive-intro-punitive with neurosis, narcotic addiction etc., the dominant-extra-punitive with psychopathy.

Cattell and Scheier agree that there is considerable hereditary fixing of this trait in a given individual, but enough scope for environmental modifiability so that deliberate control, as in therapy, is a distinct practical

possibility.

With this information it seems fairly easy to speculate why those individuals in the sample of 200 who tended towards the submissive pole on this dimension achieved well in English. A strong need for social approval along with a desire to avoid conflict and an open disposition ready to accept rather than refute, would readily manifest itself in a strong learning motivation which would conceivably lead to higher scholastic attainment. But why did the submissive group only achieve significantly higher on the English subtest, and not on any of the others? Indeed, Cattell and Butcher (1968) in their analysis of the Illinois data collected by Butcher, Ainsworth, and Nesbitt (1963) found that submissiveness (E - as measured by the HSPQ, E+ as measured by the NSQ) was a significant factor relating to school achievement as a whole. Apparently the relationship of submissiveness to English achievement alone is a characteristic distinct to the Canadian high school sample.

Recalling the differences between the present study and that of Butcher et. al., with regard to age and level of learning, it might be possible that the important role of submissiveness as a factor in overall scholastic attainment might lessen as education advances to a level where strength of conviction, competitiveness, and independent, original thinking become more important in determining scholastic success. Perhaps also, Canadian schools differ from American schools in their authoritarian demands upon the student.

Even though testing instruments are fairly constant for the present study and the Illinois study, the conditions under which children learn, and the type of student able to flourish and to digest information under differing conditions, may vary with respect to each separate sample.

Granted that differences in level of education and culture may account for a lessening of the impact of submissiveness upon achievement in the case of Canadian high school students, this still does not explain why English achievement does not experience this general effect.

Here again, as was the case with tender-mindedness, the writer posits that this personality factor determines to a large extent the habits and interests of an individual. In this manner, the quiet, retiring nature of the submissive person, coupled with an aversion for the vigorous, competitive life around him draws him into a vicarious pursuit of life by reading. He can read and phantize freely without fear of social disapproval. The remainder of the argument runs along lines similar to those utilized in explaining the connection between English achievement and tender-mindedness: the familiarity of and exposure to the written language being seen as the causal links. With this kind of interpretation, the second factor divulged by the factor analysis carried out on the Pearson correlations might now be viewed as a kind of social passivity factor.

If this argument holds up for the submissive individual, how can the relationship between high school English achieve-

ment and the lower end of the submissive dimension (dominance) be explained? In attempting to explain the discrepancy between the present study and the Illinois study with regard to the importance of submissiveness in determining scholastic attainment, it was suggested that Canadian high schools might well be less authoritarian and more open to independent thinking than American junior high schools. If this holds up, the assertive, forceful, decisive, even stubborn convictions of the dominant individual would be less of a detriment in the Canadian than in the American system, and could even be viewed as an asset. More precisely, if the stubborn orientations of this type of individual are not viewed as disadvantageous, it leaves an open field for the advantages inherent in a competitive, aggressive nature.

If one returns to Table 5 (the Pearson correlation matrix) it can be seen that indeed E- (in this case dominance) correlates negatively with mathematics, social studies, and science (the last of these being significant at the 1% level). The only relationship between submissiveness and any of the Stanford subtests which is not negative on the basis of Pearson correlations is that between submissiveness and English; and this is explained by the curvilinear nature of the relationship. These observations would seem to lend a certain amount of validity to the above speculations concerning the role of submissiveness in the Canadian high school system.

One Way Analyses of Variance on Sub-Samples

The one-way analyses of variance which were carried out on the sub-samples (i.e. males, females, urban students, rural students, matriculation students, and non-matriculation students) were performed in order to ascertain whether or not the relationship between neuroticism and overall academic attainment observed to exist from the one-way analyses of variance using the total sample (in this case there was no significant relationship), held for each of the sub-groups within the total sample. As a result of the findings of these analyses, it was possible to state with respect to the third specific hypothesis of the study, that neuroticism was not related to academic attainment for any of the sex, rural-urban, or matriculation - non-matriculation sub-groups.

Many of the relationships tabulated in Table 9 are very difficult to interpret. Indeed, those relationships which are primarily cubic or quartic on the basis of trend analysis would be very tedious to decipher, and in fact would not add much to an understanding of the hypotheses with which this study is primarily concerned.

It is possible, however, to gain a better insight into the sources of those relationships shown to exist from the Pearson correlations (Table 5), and the total sample, one-way analyses of variance (Tables 7 and 8) from some of the quadratic and linear relationships shown in Table 9. In

this manner, the positive linear relationship between English and tender-mindedness (Table 7) for the total sample, is seen to be largely the product of the relationship between these two variables for the male sub-groups within the total sample. If the interpretations made in the last section concerning social passivity and reading interest have any validity, one would expect that males would contribute more heavily to the observed relationship between English and tender-mindedness than females would. Since females are generally more submissive and tender-minded than males, it follows that as a group they would tend to read more and would in this manner commonly enjoy the advantages to English achievement inherent in this past-time. It is the male sample which would show greater differences with respect to passive orientation and reading behavior. Thus it is not surprising that males should be distinguished from each other in terms of a general relationship between English and tender-mindedness, to a greater extent than females.

The curvilinear relationship between submissiveness and English achievement shown in Table 8 is seen, from Table 9, to be largely the result of similar relationships existing in the female and rural sub-groups. From this it would seem that the submissiveness-dominance dimension plays a greater part in determining scholastic success at the rural level than at the urban level. While this may appear difficult to explain, the writer feels that it is a result of the make-up of the student population at Ponoka.

About one-half of the students attending the Ponoka Composite High School live in the rural town of Ponoka or in its very immediate vicinity. The other half are bussed to the high school from throughout the Ponoka County. The net result in terms of social relationships, is that the town students form a strong, dominant in-group within the school structure. The more socially submissive county students either align themselves with this major in-group or form small isolated groups of their own. In this manner, the submissiveness-dominance dichotomy evident with regard to scholastic success seems to be largely a product of the social structure of the student population.

The above argument coupled with the arguments already stated in explaining the one-way analyses of variance using the total sample, seems to explain the curvilinear relationship between English achievement and submissiveness for the rural portion of the sample. However, the fact that females should show this relationship between English achievement and submissiveness, and that males should not is still unexplained. Recourse to the computer output showed that a curvilinear relationship between submissiveness and English achievement for males does exist at the 7% level of significance. The arguments given to explain this relationship in the previous section are now seen as applicable to both the male and female sub-groups.

A final relationship from Table 9 which should be mentioned is the negative linear relationship between science

achievement and submissiveness which exists for the rural sub-group. The source of the negative Pearson correlation between these two variables at the 1% level of significance is now obvious. Science has already been viewed as a subject not as likely to benefit from social passivity (in terms of interests) as English.

Two-Way Analyses of Variance

The series of two-way analyses of variance was an attempt to determine the effects of sex, rural-urban, and matriculation - non-matriculation differences on the personality variables measured by the MSQ and on the various kinds of achievement measured by the Stanford High School Battery.

Looking first at the results tabulated in Table 10, the finding that males in the Canadian high school sample score more highly than females on total achievement is somewhat surprising in view of the almost unanimous consensus of many previous studies to the contrary (e.g. Northby, 1958). While true that when batteries of achievement tests are used to evaluate school performance the differences are less marked than when school performance records are used, it is very seldom that these differences favor boys over girls in terms of total achievement level. Since 63 of the 102 boys, and 56 of the 98 girls were matriculation students, the difference does not seem to be one of gross sampling inefficiency. Further, since no differences, with the exception of a

difference on social studies achievement which will be discussed later, were found between the rural and urban segments of the total sample on any of the achievement tests or on total achievement level, a town-country dichotomy does not aid us in making an interpretation.

While the superiority of males and females on total achievement seems at odds with existing research, the marked superiority of the male students in science and social studies fits in well with most of the data collected in the area of sex and scholastic achievement (see Terman and Tyler, 1954 for a summary of these studies). Although earlier studies agree that even on standardized achievement tests, what differences there are tend to favor girls, such studies have also shown that boys score higher on some subtests. Girls typically excel in English, spelling, writing and art; boys in arthimetical reasoning, history, geography, and science.

With this knowledge, it is possible to postulate that perhaps the reason for the overall superiority of boys on total achievement (the sum total of the four subtests) is that three of the four subtests used in the present study are ones on which boys have been shown to typically excel in. Indeed, the general trend in the mathematics subtest was also strongly in favor of the males and was just short of being significant. The only one of the subtests which showed a tendency for female superiority was English, but this result was also not significant. The relationships

found between sex and achievement, when looked at in this way, can now be seen to be in general agreement with most of the research findings from past studies.

The differences between males and females with regard to the Cattell personality variables measured by the NSQ (see Table 10) also fit in nicely with what information already exists. The finding that women score significantly higher on total neurotic level than men do comes as no surprise since this has been a common finding using many inventories of "neuroticism", (e.g. Bernreuter, 1933). In the case of the NSQ, the picture of neuroticism must be built up from the component scores, but the total neuroticism score is still the one figure which best gives the general probability of belongingness in the neurotic category as defined clinically.

The significant relationships between submissiveness and femininity, and tender-mindedness and femininity are also collaborated by many researches (e.g. Cattell, 1957; Cattell and Eber, 1964). The source of these relationships can be seen readily by reviewing the respective personality profiles presented earlier of the tender-minded and the submissive individual. The societal stereotype of femininity with its emphasis on sensitivity, and sentimentality fits in nicely with the picture of the submissive or tender-minded person. It is consistent with preceeding results that females generally score higher on these two personality dimensions and that they also show a slight tendency to do better in terms of English achievement.

The significant differences found between matriculation and non-matriculation students on the NSQ and Stanford variables have been tabulated in Table 11. The significant differences between the matriculation and non-matriculation groups on each of the Stanford subtests and on total achievement level are of little interest since academic record is the main basis upon which students divide into these two groups. Once in the matriculation group, a more pronounced emphasis is placed upon science, mathematics, social studies, and English. Although non-matriculation students may take similar courses, the degree of difficulty and the level of competence desired are generally not so great.

The very interesting result here is that matriculation and non-matriculation students in this sample seem to be differentiated from each other on the basis of the personality dimension of tender-mindedness. It is difficult to see why this should be the case, recalling from Table 7, that the only significant relationship between this dimension and any of the achievement subtests was that with English. Further, as contrasted with the common direction of all the relationships with submissiveness, the relationships of the achievement scores with tender-mindedness are of small number and have differing directions, some being positive and some negative.

When attempting to explain the high positive relationship between English achievement and tender-mindedness it was suggested that the interests of the tender-minded individual, as dictated and affected by his personality, lead to the

incorporation of reading as a significant factor in his life style. Since the other areas which were tested by the Stanford subtests did not benefit so much from a familiarity with the form of the English language as did the English test, there was no reason why these would have been similarly affected.

Yet, an ability to read well and to be able to make the cognitive connection between the written word and the idea or logic it conveys is basic to all intellectual, academic study. The fact that the truly tender-minded person lacks the practical, realistic approach more typical of the I- personality, somewhat modifies this basic advantage in the areas of mathematics, science, and social studies; but does not mean that a good reading ability is not an asset in these areas as well. It simply means that other things besides reading ability are also necessary for success. Thus, it seems feasible to suggest that a certain level of tender-mindedness is necessary for successful scholastic standing - that a certain level of tender-mindedness separates the matriculation from the non-matriculation student. Once this level is reached and surpassed it may not be necessarily true that the higher the I score, the higher the achievement, although this type of positive linear relationship can be seen in English achievement.

If this line of reasoning is at all correct, it would explain that while there is nothing approaching a significant relationship between tender-mindedness and mathematics,

science, or social studies; there is a differentiation between matriculation (which can very generally be conceived as being higher achievers, although the two terms are by no means synonymous) students and non-matriculation students on the basis of this dimension.

It might also be true that given two individuals of equal academic ability, something about the more tender-minded person makes him choose a matriculation pattern while the other opts for a non-matriculation program. In this connection, the idealism, imagination, and fanciful nature of the tender-minded person might make him oblivious to his actual abilities. At any rate, it should be remembered that matriculation students are not always those with superior academic records.

As already stated, only one significant discrepancy evolved from the two-way analyses with regard to differences between rural and urban students. This was the finding that rural students scored, on the average, higher on the Stanford social studies subtest than did their urban counterparts (5% level of significance). Because of curriculum differences, however, it is not thought that this discrepancy points to any basic underlying difference in the pattern of academic achievement between the two portions of the sample.

As mentioned previously, each individual instructor at the Grade 11 level in the Province of Alberta has a certain modified freedom in choosing the subject matter which is to be taught in his courses. As a result of this

freedom many of the M.E. Lazerte students had been, at the time of the testing (towards the end of October), studying the basic doctrines, philosophies, and ideologies of communism, democracy, and fascism as part of their social studies course; while many of the Ponoka students had been involved in pursuing a study of American and Canadian history. When it is realized that a large number of the questions in the Stanford social studies subtest dealt with or alluded to aspects of United States history, the fact that the Ponoka students did better on this test is not surprising. Although the testing of the sample was done in sociology, psychology, and English periods as well as during social studies periods, almost all the students (certainly all the matriculation students) took social studies during some part of the school day.

The failure to observe any differences on any of the Cattell dimensions measured by the NSQ between rural and urban groups seems somewhat suprising given the number of myths and common sense notions surrounding city and country personalities. Cattell and Butcher (1968) report a slight discrepancy between rural and urban segments of the Illinois sample on the dimension of tender-mindedness - rural children tending to be less tender-minded than urban children. However, they too conclude that results of testing the rural sample pointed in very much the same direction as those reported for the urban sample.

The final significant result from the two-way analyses

of variance was that an interaction effect was observed between rural-urban and matriculation - non-matriculation differences as they affect social studies achievement (5% level of significance). Rural matriculation students scored, on the average, much higher than did any other segment of the total sample. This result would again seem to depend upon the fact that all Grade 11 students enrolled in the Ponoka Composite High School were being instructed in American history coupled with the already observed superiority of matriculation to non-matriculation students on all of the Stanford subtests.

Implications for School System and Classroom

From the analyses of the data collected from 200 Alberta high school students, it is clear that no relationship exists between neuroticism as measured by the NSQ and overall academic achievement as measured by the Stanford High School Battery. The two main factors coming out of the factor analysis of the data can now be respectively seen as a general achievement factor and a social passivity factor which is also loaded on English achievement. The question which now needs to be considered is to what extent are these findings applicable to the school system and classroom?

The overall finding that the personality variable of neuroticism is not related to academic attainment must mean that the other end of the neuroticism - stability dimension (i.e. stability) is also unrelated to academic attainment.

This conclusion stands at odds with the majority of the research done in the area of personality and academic achievement (i.e. that research which points to a relationship between stability and academic attainment). Possible explanations for this discrepancy will be discussed in the summary section of the present paper.

The fact that the neuroticism - stability dimension is unrelated to academic attainment for the Alberta high school sample, might suggest that neurotic-type maladjustment has been commonly exaggerated as a block to successful academic performance or learning. The idea that the maladjusted child is scholastically disadvantaged may not be true (on the basis of the present findings) when neurotic maladjustment is considered. Indeed, the ability of most neurotics to function in society seems to back up this statement. No doubt degree of neuroticism has an affect upon individual happiness and freedom from emotional suffering, but this does not seem to carry over to learning as such. In much the same manner, the general belief that the stable child is a superior achiever is not supported.

It is the feeling of the writer, that factors of motivation, perserverence, and ambition, over-ride the effects of adjustment factors on academic performance. What the more neurotic individual loses in terms of maladjustment, he may gain in terms of obsessive organization, unrealistic drive, etc. It would seem that if learning were the sole concern of our school systems, that educational research should

concentrate more on motivation than on adjustment. However, the social well-being of the child is also a concern for educators and its contributing etiology may differ drastically from that responsible for learning behavior.

Another important fact which does not seem to be fully understood by many researchers in this area, is the vast complexity of a classification such as "neuroticism". The neuroticism score on the Eysenck and Cattell questionnaires is really a mosaic, a mixture of essentially unrelated ingredients, each of which must be assessed if the mixture is to be understood thoroughly. There is an almost indefinite number of combinations of dimension scores which would give a specific neuroticism score, and each different combination implies a different etiological picture, a different pattern of determination and expression, a different diagnosis and prognosis, and finally, a different pattern of learning behavior. It may be that many important connections between personality dimensions and different types of achievement have been obscured by studies dealing only with broad overriding factors such as neuroticism.

The present study has related English achievement to tender-mindedness and submissiveness. Other specific relationships of this nature may also be found in the area of personality and academic attainment. Of course, just how culturally specific these relationships are is an important consideration. For example, with regard to the four personality dimensions measured by the NSQ, there seem to be some

interesting discrepancies between Canadian students and those tested in Great Britain and the United States. The most striking of these is the discrepancy concerning the role of submissiveness as it relates to academic achievement. While submissiveness was found to correlate positively with scholastic success for both British and American students, the direction of all but one of the relationships between submissiveness and the Stanford high school subtests for the Canadian sample were in a negative direction (See Table 5).

This might point to a basic difference in personality between citizens of the various countries involved, or it might point to a difference in school administration and teaching methods. For example, it might be that Canadian schools tend to emphasize original thought and individual freedom of learning more than British or American schools.

However, it is not the point of this discussion to establish any form of causality, since to attempt to do so is going beyond the limitations of ex-post-facto research. However, if studies of the present type can succeed in providing a psychological picture of the student who typifies various kinds of achievement levels, this should provide a basis upon which school systems could re-evaluate their priorities if need be. At this stage, more time consuming, and costly longitudinal studies could be carried out to determine the exact ways in which a school system shapes the student.

In summary, position on the neuroticism-stability

dimension does not seem to affect learning behavior as manifest in academic performance. If scholastic success is the main priority of a school system (note that it is Alberta high schools which are being discussed), then that system need not concern itself with student adjustment. If student adjustment is important in terms of other school priorities such as emotional growth and maturity, or sociability, it is for the system to decide the priority hierarchy. In so doing, information as to the personality make-ups of its students should be invaluable.

CHAPTER 6

Summary

In the final analysis the findings of the present study seem neither to support the findings of such research - workers as Lynn (1957, 1959) and Furneaux (1956, 1962); nor the quite different findings of others of whom Ballham (1961) and Warburton and Hadley (1960) are typical. In attempting to explain these differences it should be recalled that the sample used in the present study was unique in two facets in comparison with the samples used in the research studies alluded to in the literature review section of this thesis. In none of these studies were the samples made up of Canadian students or high school students averaging 16 years of age, as was the case in the Alberta study. Cultural differences, differences in the relationship between neuroticism and academic attainment with respect to level of education and age, and differences in school environment as it affects this relationship; are all explanatory possibilities which need further investigation. Given these differences it is not surprising that various studies should differ in their findings. It is a great temptation to generalize results, however it should be remembered that results of a more specific nature may often times be more helpful when dealing with specific situations.

Interestingly enough, while the results of the Alberta study refute the postulations of Lynn and Furneaux, amongst others (at least for Alberta Grade 11 students), the findings of the pilot study seem to strongly support the position of these two researchers. In the pilot study, as in the studies by Furneaux and Lynn, neuroticism is positively related to scholastic success. In attempting to explain this observation, it seems strikingly significant that the research designs of these experiments were very similar. All the studies used samples made up of relatively successful academic performers in comparison to the groups with which statistical comparisons were made. (Of course, the sample used for the main study related in this thesis was divided into matriculation and non-matriculation students and comparisons were made between these subgroups both on variable scores and on variable relationships. However, it must be remembered that matriculation students are not necessarily high achievers.) Obviously this type of research does not give much insight into the exact nature of the relationship between academic achievement and neuroticism.

As stated in Chapter 1, the question, "What is the relationship between neuroticism and academic attainment for all students?", is quite different from the question "What is the relationship between neuroticism and academic attainment for successful students?". The pilot study seems to support this difference.

Personality variables inevitably influence interests and motivations which have direct repercussions in the field of academic performance. Understandably, modes of expressing interests, and opportunities to channel motives differ considerably from country to country. Many instances of the generation of interest and dynamic trait patterns between the pressures of environment on the one hand, and the ability, personality, and physical 'givens' of the individual on the other, exist in recent research.

It seems to follow from this, that the relationships between academic attainment and personality and dynamic factors will obviously change, statistically, with local social characteristics and school selection. The importance of individual personality dimensions will vary. Differences are seen between the personality and motivation structures which command success in one type of school and in another. Research of the present type might not only make it possible to eventually determine what type of personality will achieve well in a particular school, but also what type of school system should be incorporated to make use of the inherent learning motivations within a society or culture.

In conclusion, it should be stated that ex-post-facto research of the type of which the present study is an example, inevitably leaves many questions unanswered. Because of complicated questions of time, cost, and ethics,

which many other types of research involve, and which are minimal in this type of research, ex-post-facto research is usually a fore-runner to other more sophisticated forms. If relationships are apparent from an ex-post-facto research, lengthy and costly longitudinal and laboratory experiments can be rationalized to determine questions of causality and applicability. So far, research in the area of personality and academic achievement has been primarily of an ex-post-facto kind because of the necessity of proving that relationships between the two actually do exist and to what extent this is common to varying environments. Once a store of data has been accumulated from differing school systems, grade levels, countries and cultures; studies throwing light on the direction of causality, rather than on the mere fact of correlation, will be urgently needed.

In the interim, ex-post-facto research is obviously of more value if it can be subjected to certain kinds of control. The problem of research design has been mentioned, and it has been shown that without certain common methodology research studies supposedly designed to answer the same questions, may in fact be testing quite different hypotheses. In a very similar fashion, differences in testing instruments may also conflict results. Great care has been taken by several research workers in the area of personality and academic attainment to make

exclusive use of Eysenck and Cattell personality inventories, however, no such effort has been made to standardize achievement criteria. Given these kinds of control, it might finally be possible to obtain consistent results from studies in the area of personality and academic attainment. However, unless such steps are taken, the chaos now manifest in this research area will continue to exist regardless of how many studies are done.

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APPENDIX A
TABLES OF MEANS

TABLE I

English Achievement Scores Grouped
on Tender-mindedness
(Total Sample n = 200)

Group	Mean I Scores	Mean English Scores
1	3.81	38.44
2	6.76	39.44
3	8.60	43.32
4	10.61	42.81
5	12.45	48.21
6	14.47	49.64
7	16.23	53.80

TABLE 2

English Achievement Scores Grouped
on Submissiveness
(Total Sample n = 200)

Group	Mean E Scores	Mean English Scores
1	3.00	54.40
2	6.81	45.50
3	8.42	43.74
4	10.73	38.33
5	12.46	45.74
6	14.58	44.20
7	16.20	51.05

TABLE 3

English Achievement Scores Grouped
on Tender-mindedness
(Males Only n = 102)

Group	Mean I Scores	Mean English Scores
1	4.52	8.55
2	5.81	11.66
3	7.00	11.42
4	8.25	12.56
5	10.49	13.83
6	11.48	14.52
7	14.17	14.70

Table 4

Total Achievement Scores Grouped on
Tender-mindedness
(Males only n = 102)

Group	Mean I Scores	Mean Total Achievement Scores
1	4.52	125.33
2	5.81	134.89
3	7.00	139.79
4	8.25	123.95
5	10.49	131.87
6	11.48	142.46
7	14.17	128.04

Table 5

English Achievement Scores Grouped
on Submissiveness
(Females Only n = 98)

Group	Mean E Scores	Mean English Scores
1	5.84	51.21
2	8.48	44.71
3	10.42	33.91
4	12.00	31.64
5	13.05	40.84
6	14.47	48.13
7	16.41	53.31

Table 6

Total Achievement Scores Grouped
on Submissiveness
(Females Only n = 98)

Group	Mean E Scores	Mean Total Achievement Scores
1	5.84	123.43
2	8.48	104.73
3	10.42	116.69
4	12.00	134.67
5	13.05	110.25
6	14.47	118.91
7	16.41	135.38

Table 7

Science Achievement Scores Grouped on
Tender-mindedness
(Urban Students Only n = 56)

Group	Mean I Scores	Mean Science Scores
1	4.99	30.57
2	7.00	37.83
3	8.24	41.33
4	10.15	28.90
5	11.24	38.00
6	12.78	39.90
7	13.43	34.56

Table 8

Total Achievement Scores Grouped on
Tender-mindedness
(Urban Students Only n = 56)

Group	Mean I Scores	Mean Total Achievement Scores
1	4.99	107.14
2	7.00	121.83
3	8.24	139.33
4	10.15	130.43
5	11.24	106.80
6	12.78	141.14
7	13.43	112.83

Table 9

Mathematics Achievement Scores Grouped
on Anxiety
(Rural Students Only n = 144)

Group	Mean A Scores	Mean Mathematics scores
1	5.02	21.83
2	8.47	23.64
3	10.00	27.00
4	11.24	21.85
5	12.56	21.21
6	13.59	21.54
7	15.81	25.44

Table 10

English Achievement Scores Grouped
on Submissiveness
(Rural Students Only n - 144)

Group	Mean E Scores	Mean English Scores
1	4.56	51.92
2	8.00	39.00
3	9.12	38.15
4	10.21	43.35
5	11.63	44.41
6	13.25	46.37
7	15.88	52.19

Table 11

Science Achievement Scores Grouped
on Submissiveness
(Rural Students Only n = 144)

Group	Mean E Scores	Mean Science Scores
1	4.56	35.33
2	8.00	31.58
3	9.12	30.51
4	10.21	29.67
5	11.63	27.74
6	13.25	26.64
7	15.88	26.04

Table 12

Total Achievement Scores Grouped
on Submissiveness
(Rural Students Only n = 144)

Group	Mean E Scores	Mean Total Achievement Scores
1	4.56	150.82
2	8.00	139.94
3	9.12	132.61
4	10.21	129.04
5	11.63	133.20
6	13.25	136.51
7	15.88	143.47

Table 13

English Achievement Scores Grouped
on Depressiveness
(Rural Students Only n = 144)

Group	Mean F Scores	Mean English Scores
1	3.96	51.21
2	5.83	47.71
3	7.00	41.24
4	8.12	36.61
5	9.36	44.52
6	10.92	43.20
7	13.78	48.38

Table 14

Science Achievement Scores Grouped
on Tender-mindedness
(Matriculation Students Only n = 119)

Group	Mean I Scores	Mean Science Scores
1	4.21	44.47
2	7.09	43.14
3	9.72	40.65
4	11.11	34.14
5	12.23	41.26
6	13.56	40.07
7	15.01	38.00

Table 15

Science Achievement Scores Grouped
on Submissiveness
(Matriculation Students Only n = 119)

Group	Mean E Scores	Mean Science Scores
1	4.58	35.12
2	7.59	31.84
3	8.07	26.75
4	9.23	30.46
5	11.67	25.01
6	12.35	36.02
7	16.21	35.99

Table 16

Total Achievement Scores Grouped
on Depressiveness
(Non-Matriculation Students Only n = 81)

Group	Mean F Scores	Total Achievement Scores
1	4.11	107.89
2	5.92	111.00
3	7.72	121.69
4	9.01	110.11
5	10.18	125.67
6	12.43	117.89
7	15.02	101.20

APPENDIX B

EIGEN VALUES AND COMPLETE FACTOR ANALYSIS

Eigenvalues from Pearson Correlation
Matrix (Table 5)

Unrotated Factors

	Factor 1	Factor 2
1. English (2.554)	70	43
2. Mathematics (1.484)	79	04
3. Social Studies (1.113)	83	08
4. Science (0.891)	84	17
5. Tender-mindedness (0.661)	01	77
6. Depressiveness (0.497)	06	06
7. Submissiveness (0.458)	-17	66
8. Anxiety (0.342)	-19	47

n = 200

Varimax Rotation

Communalities

0.674 0.620 0.687 0.728 0.600 0.007 0.466 0.256

Rotated Factors

Communalities

1

2

1.	0.674	0.764	0.301
2.	0.620	0.768	-0.176
3.	0.687	0.827	-0.061
4.	0.728	0.794	-0.313
5.	0.600	0.143	0.761
6.	0.007	0.048	-0.071
7.	0.466	-0.051	0.680
8.	0.256	-0.100	0.496
	4.038	2.522	1.516

Transformation Matrix

0.985	-0.173
0.173	0.985

Equamax Rotation

Communalities

0.674 0.620 0.687 0.728 0.600 0.007 0.466 0.256

Rotated Factors

Communalities

1

2

1.	0.674	0.764	0.301
2.	0.620	0.768	-0.176
3.	0.687	0.827	-0.061
4.	0.728	0.794	-0.313
5.	0.600	0.143	0.761
6.	0.007	0.048	-0.071
7.	0.466	-0.051	0.680
8.	0.256	-0.100	0.496
	4.038	2.522	1.516

Transformation Matrix

0.985	-0.173
0.173	0.985

Quartimax Rotation

Communalities

0.674 0.620 0.687 0.728 0.600 0.007 0.466 0.256

Rotated Factors

Communalities

1

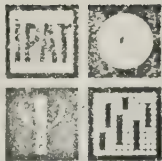
2

1.	0.674	0.763	0.304
2.	0.620	0.768	-0.172
3.	0.687	0.827	-0.057
4.	0.728	0.795	-0.309
5.	0.600	0.140	0.762
6.	0.007	0.049	-0.070
7.	0.466	-0.054	0.680
8.	0.256	-0.103	0.495
	4.038	2.524	1.514

Transformation Matrix

0.986	-0.168
0.168	0.986

APPENDIX C
NEUROTICISM SCALE QUESTIONNAIRE .



First Edition

NSQ

NAME _____ TODAY'S DATE _____
First Middle Last
SEX _____ AGE _____ OTHER FACTS _____
(Write M or F) (Nearest Year) (Address, Occupation, etc., as Instructed)

This booklet asks questions about your attitudes and opinions—what you do and how you feel about certain situations. Some people feel one way; other people feel another way. Thus, there are no “right” or “wrong” answers to the questions.

For practice, start with the two simple examples just below. As you see, each one is in the form of a sentence. By putting a cross, X, in ONE of the three boxes on the right you show how it applies to you. Make your X now on the two examples.

1. I like to go swimming. Yes In-Between No
☐ ☐ ☐

A middle box is provided for the times when you cannot definitely say Yes or No. But use this middle box as little as possible.

2. I would rather spend an evening: A B C
(A) Talking to people. (C) At a movie. ☐ Undecided ☐

About half the sentences inside end in A and C choices like this. A is always to the left and C is always to the right. Remember, use the middle “In-Between” or “Undecided” box only if you cannot possibly decide between A or C.

Now:

1. Make sure you have put your name and whatever else is asked for at the top of this page.
2. Never pass over a question, but give some answer to every single one. Your answers will be entirely confidential, so answer truthfully.
3. Do not spend time puzzling things out. Answer each question immediately, the way you want to at this moment (not last week, or usually). You may have answered questions like this before, but answer them as you feel NOW.

Most people finish in five to ten minutes. Hand in this booklet as soon as you are through with it, unless told to do otherwise. As soon as the signal is given, turn the page and begin.

STOP HERE — WAIT FOR SIGNAL

ANSWER ONLY IN BOXES TO THE RIGHT.
MARK ONLY ONE BOX FOR EACH QUESTION.

★
PUT ANSWERS BELOW

Do not
write
in this
column

- | | A | B | C |
|---|--------------------------|--------------------------|--------------------------|
| | Yes | In-Between | No |
| 1. In school, what I liked best was:
(A) English.
(C) Arithmetic or Mathematics. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Every now and then, I really like to engage in a tough physical activity. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. I strongly enjoy the slap-stick humor of the usual television comedy show. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. I would rather read:
(A) A realistic description of military battles.
(C) An imaginative and sensitive novel. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. If somebody interrupts me when I'm talking, I forget what I'm talking about.
(A) Yes, often. (B) Sometimes. (C) Hardly ever. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. I enjoy more an evening:
(A) At a lively party with friends.
(C) With a good hobby of my own. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. I prefer to dress:
(A) Very quietly, correctly, and conservatively.
(B) In an average way.
(C) With some definite style that people can see. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. I like to go out to a show or entertainment:
(A) Less than once a week (less than average).
(B) About once a week (average).
(C) More than once a week (more than average). | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. I can tell a complete lie with a straight face:
(A) Whenever it is right to do so.
(B) With a little difficulty.
(C) Never under any circumstances. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. I greatly like to play practical jokes. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. I like it when I know so well what the group has to do that I naturally become the one in command. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. In my spare time, I would rather join:
(A) A hiking and exploring club. (C) A community service organization. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 13. I believe it is right to be modest and understate how good I am at something, when people ask. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 14. If I think a person is wrong in a discussion, I tell him so:
(A) Only if it can be done politely. (B) Sometimes. (C) Almost always. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 15. The use of dirty or foul language disgusts me (even if there are only people of my own sex present). | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 16. I find it upsetting to have to move all my belongings to a new place. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 17. I would rather listen to: (A) A brass band. (C) A good church choir. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 18. When annoyed, I may say things that hurt people's feelings:
(A) Never. (B) Rarely. (C) Sometimes. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 19. I often feel quite tired when I get up in the morning. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 20. I need to have things "just so," in order to concentrate on my work. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

GO RIGHT ON TO THE NEXT PAGE.

I

F

I

An

Total



Do not
write
in this
column

21. I would rather be:
(A) A guidance worker with young people seeking careers. ☐ A ☐ Undecided ☐ C
(C) A manager in a technical manufacturing company. ☐ ☐ ☐
22. In school, what I liked best was:
(A) Handwork and crafts. (B) Each about the same. (C) Music. ☐ A ☐ B ☐ C
23. I would rather spend my vacations:
(A) In places in my own country, where I know I'll have a good time. ☐ A ☐ Undecided ☐ C
(C) In foreign lands that are colorful and "different." ☐ ☐ ☐
24. The newspaper headline that would interest me more is:
(A) Latest improvements in Production and Marketing. ☐ A ☐ Undecided ☐ C
(C) Religious Leaders Discuss a Unified Religion. ☐ ☐ ☐
25. I think I am more sensitive than most people to the artistic quality of my surroundings. ☐ Yes ☐ In-Between ☐ No
26. I have a tendency to be:
(A) A rather reckless optimist (too sure things will go well). ☐ A ☐ Undecided ☐ C
(C) An overcautious pessimist (too sure things will go wrong). ☐ ☐ ☐
27. I have a hard time putting work out of my mind and relaxing. ☐ Yes ☐ In-Between ☐ No
28. I like to crack jokes and tell funny stories:
(A) Hardly ever. ☐ A ☐ B ☐ C
(B) Sometimes. ☐ ☐ ☐
(C) Often. ☐ ☐ ☐
29. I would rather be:
(A) An actor. ☐ A ☐ Undecided ☐ C
(C) A house builder. ☐ ☐ ☐
30. I enjoy acting on impulses of the moment (even if they do sometimes land me in a few difficulties later). ☐ Yes ☐ In-Between ☐ No
31. I feel it is more important to:
(A) Get my own ideas put into practice. (C) Get along smoothly with others. ☐ A ☐ Undecided ☐ C
32. When I need immediately the use of something belonging to a friend, but he is out, I think it's all right to borrow it without his permission. ☐ Yes ☐ In-Between ☐ No
33. It is more important to me:
(A) To enjoy my life quietly in my own way. ☐ A ☐ Undecided ☐ C
(C) To be admired and respected for what I have done. ☐ ☐ ☐
34. If I had a loaded gun in my hand, I would feel nervous until it was unloaded. ☐ Yes ☐ In-Between ☐ No
35. I never try to ask help of people I know only slightly. ☐ True ☐ In-Between ☐ False
36. Sometimes I let small things get on my nerves too much. ☐ Yes ☐ In-Between ☐ No
37. Worrying keeps me awake at night. ☐ Never ☐ Sometimes ☐ Often
38. I feel well-adjusted to life and its demands:
(A) All of the time. (B) Most of the time. (C) Less than half the time. ☐ A ☐ B ☐ C
39. I feel that people are not as considerate of me as my good intentions deserve. ☐ True ☐ In-Between ☐ False
40. I sometimes get tense and upset as I think back on the day's happenings. ☐ Yes ☐ In-Between ☐ No

STOP HERE. MAKE SURE YOU HAVE ANSWERED EVERY QUESTION.

Total

NSQ RECORD SHEET

Name _____ Sex _____ Age _____ Date _____ Examiner _____

FOR EXAMINER'S USE ONLY

Other Data:

ANALYSIS INTO COMPONENTS				
TOTAL	Sen sit.	De fpr.	Sub Emiss.	An.
Raw Score				
Sten Score				
High	•	•	•	•
10	•	•	•	•
9	•	•	•	•
8	•	•	•	•
7	•	•	•	•
6	•	•	•	•
5	•	•	•	•
Average Range				
4	•	•	•	•
3	•	•	•	•
2	•	•	•	•
1	•	•	•	•
Low				
TOTAL	Ten High	Ch Fper.	De Emin.	Not An.

Comments:

Recommendations:

APPENDIX D
STANFORD ACHIEVEMENT TESTS

PART A

DIRECTIONS: Below are several paragraphs in which certain parts are underlined and numbered. These numbers correspond to the number of the item on the answer sheet. For each part which is underlined and numbered, decide which one of the following choices is correct:

- C There is an error in CAPITALIZATION.
- G There is an error in GRAMMAR.
- P There is an error in PUNCTUATION.
- S There is an error in SPELLING.
- NE There is NO ERROR.

Then, on your separate answer sheet, fill in the space which has the same letter as the answer you have chosen.

SAMPLES

There was three puppies in the box.

A

Its a great day for the Yankees.

B

THE OLD SOUTH

Ever since I first read *Gone With the Wind* every other romance of the old south
have seemed nothing but cheap and imitative. In story after story, I've read about the
fiery vixen and the reckless blockade runner (or, at least, some variation of this.) The heroine's
name may be slightly different: quite frequently, it's french. Whether you're an admirer of
Miss Mitchell or not, you'll have to admit Rhett Butler is quite an absorbing character, while the
imitations of him are insipid. Practically everyone, from Scarlett to the poor Union soldier, are
always included. Even old Mammy is always there. I sometimes think us admirers of the
romantic tradition should put a stop to this business.

10

THE PRESIDENCY

When the president of the United States makes a decision, the population of the whole world
are affected. Even though he makes an address to just one group on the west Coast, the rest
of the world listens. Even when he is just quietly dining with his family somebody is
listening. Each of us sometimes feel lonely, but none of us is ever as alone as he. When he
is entirely surrounded by others and in the center of our nation's government, he stands by
himself; Because he knows that for whatever decision he makes he must be solely responsible for.
He is not just the most important man alive; he is the most burdened. Not even congress can
very easy lessen this burden. And, no matter how many privileges he receives in his
office he can rarely enjoy them.

20

- C There is an error in CAPITALIZATION.
 G There is an error in GRAMMAR.
 P There is an error in PUNCTUATION.
 S There is an error in SPELLING.
 NE There is NO ERROR.

JUNIOR

My great-grandfather once knew a great horse, that was in the U. S. army during the Spanish-American War. He had been at all the famous battles, he had fought good. He was eventually given a citation for his bravery by being place on the commanding staff of cavalry horses. When he died a soldier's grave and a ceremony were given him. Later the historical Society put all his medals and equipment on display there. His name, incidentally, was U. S. Grant, jr.

A FAMILY TRADITION

It's always been traditional in our family to have a picnic on Independence Day. And this year I'm sure, will be no acception. We'll start out early in the afternoon and heading for the beach. After we've swum for several hours, Mother will send us all in serch of wood for the fire. In the meantime, she will be perparing the chicken to be cooked. Then Dad collects the wood and begins to build the fire, and us kids dash off to take that last swim. When the chicken is ready everyone digs in. In addition to chicken, there is always plenty more to eat: Potato salad, sandwiches, a couple of vegetables, and at least two deserts, such as cake and cookies.

MILDRED GENTRY

Mildred Gentry was one of those girls who I always thought would never marry. This was because she always acted as if she were totaly unaware of men. What's more she never seemed to care that she wasn't popular; no matter how hard us popular girls tried to get her dates she never showed any enthusiasm. So when the local newspaper anounced her engagement, we were shocked, it was, to say the least, quite a surprise. Even more surprising was the fact that her fiancé was obviously an outstanding young man. He was extremely wealthy and the President of a large company; He also held degrees from three Universities.

PART B

DIRECTIONS: Read each of the following groups of sentences carefully. Decide which one of the four sentences under each number *expresses the idea best*. Then, on your separate answer sheet, fill in the space which has the same number as the sentence you have chosen.

- 51 1 Not having read his lesson, and not paying attention in class, Johnny, failed the test.

2 Johnny hadn't read his lesson, and didn't pay attention in class, but he failed the test.

3 Because he hadn't read the lesson or paid attention in class, Johnny failed the test.

4 Failing the test, Johnny, who hadn't read the lesson, had not paid attention in class.

- 52 5 My close friend is Mary Reid, who has seven children, and she is always exhausted, and she never complains.

6 Mary Reid has seven children and is my close friend; being always exhausted, she never complains.

7 Although Mary Reid, my close friend, has seven children and is always exhausted, she never complains.

8 Always exhausted, Mary Reid is my close friend; she never complains, and she has seven children.

- 53 1 Every year, when the big spring rains come, basements and yards are often badly flooded, being also damaged.

2 Basements and yards, when the big spring rains come every year and flood them, are often damaged.

3 Causing damage, each year the big spring rains come, flooding basements and yards.

4 When the big spring rains come each year, basements and yards are often flooded and damaged.

- 54 5 Larry, who was the best quarterback on the squad, couldn't play in the game, and it was because he had broken training.

6 The best quarterback on the squad was Larry, but he couldn't play in the game, having broken training.

7 Larry couldn't play in the game — although the best quarterback on the squad — because he had broken training.

8 Although he was the squad's best quarterback, Larry couldn't play in the game because he had broken training.

- 55 1 The purse lying in the corner of the closet had obviously been there some time for it was covered with dust.

2 The purse, which obviously had been there some time — lying in the corner of the closet — was covered with dust.

3 Because the purse was lying in the corner of the closet, it had obviously been there some time, being covered with dust.

4 Because it was covered with dust, the purse had obviously been there some time, for it lay in the corner of the closet.

- 56 5 Finding the door locked, she had no key, tried to get in through a window, and could find no ladder.

6 When she found the door locked, she discovered she had no key; when she tried to get in through a window, she could find no ladder.

7 The door was locked when she couldn't find a key, and she couldn't get through a window, finding no ladder.

8 She tried to get in through a window because she didn't have a key; having found the door locked, there was no ladder.

57 1 After a whole day of swimming, even Jerry, being a good athlete, was exhausted, full of sun and water.

2 Even Jerry, a good athlete, who had had too much sun and water, was exhausted from swimming all day.

3 A good athlete after a full day of sun and water, even Jerry was exhausted, for he swam all day.

4 After a full day of swimming, even Jerry, a good athlete, was exhausted from too much sun and water.

58 5 The student who was caught plagiarizing was given an "F" in the course and expelled from school.

6 Although the student who was caught plagiarizing was expelled from school, he was also given an "F" in the course.

7 Because the student who was caught plagiarizing was expelled from school, he was given an "F" in the course.

8 The student, who was expelled from school, was given an "F" in the course and was caught plagiarizing.

59 1 The boxes, which had been accumulating for twenty years, suddenly caught fire and caused the whole house to burn.

2 Suddenly catching fire, the boxes, which caused the house to burn, had been accumulating for twenty years.

3 Having been accumulating for twenty years, the boxes, which suddenly caught fire, caused the house to burn.

4 The boxes which caused the house to burn had been accumulating for twenty years, and they suddenly caught fire.

60 5 Extending far out into the ocean is a peninsula, which is one of our fifty states, Florida.

6 The peninsula of Florida, one of our fifty states, extends far out into the ocean.

7 One of our fifty states which extends far out into the ocean is Florida, a peninsula.

8 Florida is a peninsula and one of our fifty states, extending far out into the ocean.

PART C

DIRECTIONS: Each of the following groups of five sentences comprises a meaningful paragraph, but the order of the sentences has been jumbled. Read each group of sentences and decide what would be the *best order* in which to arrange the sentences to form a well-organized paragraph. Then answer the questions at the right of each group of sentences by filling in the correct spaces on your separate answer sheet.

Paragraph 1 (Questions 61–65):

- | | |
|---|---|
| a How remarkable is the growth and development of a baby! | 61 Which sentence (a, b, c, d, or e) should be placed <i>first</i> ? |
| b By eight or nine months, he usually has learned to crawl. | 62 Which sentence (a, b, c, d, or e) should be placed <i>second</i> ? |
| c From this point on, his vocabulary increases daily, and he quickly picks up new skills. | 63 Which sentence (a, b, c, d, or e) should be placed <i>third</i> ? |
| d Within his first six months, he learns to sit up, to play, and to identify people. | 64 Which sentence (a, b, c, d, or e) should be placed <i>fourth</i> ? |
| e When a year old, he walks, feeds himself, and begins to talk. | 65 Which sentence (a, b, c, d, or e) should be placed <i>fifth</i> ? |

Paragraph 2 (Questions 66–70):

- | | |
|--|---|
| a Thus, if such a system ignores these functions, it is a failure as a true public servant. | 66 Which sentence (a, b, c, d, or e) should be placed <i>first</i> ? |
| b It should also entertain. | 67 Which sentence (a, b, c, d, or e) should be placed <i>second</i> ? |
| c Finally, it should exert some cultural influence. | 68 Which sentence (a, b, c, d, or e) should be placed <i>third</i> ? |
| d Ideally, if it intends to be effective, a public communication system should serve three purposes. | 69 Which sentence (a, b, c, d, or e) should be placed <i>fourth</i> ? |
| e The first of these is to instruct or inform. | 70 Which sentence (a, b, c, d, or e) should be placed <i>fifth</i> ? |

Paragraph 3 (Questions 71–75):

- | | |
|---|---|
| a Now, after all this evidence, why, I ask, does anyone want to own one? | 71 Which sentence (a, b, c, d, or e) should be placed <i>first</i> ? |
| b Most importantly, it's expensive to buy, expensive to run, and expensive to repair. | 72 Which sentence (a, b, c, d, or e) should be placed <i>second</i> ? |
| c To top it all off, it's worth about half as much when you go to sell it a year later as when you bought it. | 73 Which sentence (a, b, c, d, or e) should be placed <i>third</i> ? |
| d The automobile is more trouble than it is anything else. | 74 Which sentence (a, b, c, d, or e) should be placed <i>fourth</i> ? |
| e And what's more, the insurance always falls due at Christmas. | 75 Which sentence (a, b, c, d, or e) should be placed <i>fifth</i> ? |

Paragraph 4 (Questions 76-80):

- a I can even tolerate the lack of variety.
- b I think it can be agreed that popular music is terrible today.
- c And I can put up with stupid lyrics.
- d I can stand the dull harmony.
- e But, I will never be able to stand vocal renditions which come straight through the nose — even when they're on key, which they usually aren't.

- 76 Which sentence (a, b, c, d, or e) should be placed *first*?
 - 77 Which sentence (a, b, c, d, or e) should be placed *second*?
 - 78 Which sentence (a, b, c, d, or e) should be placed *third*?
 - 79 Which sentence (a, b, c, d, or e) should be placed *fourth*?
 - 80 Which sentence (a, b, c, d, or e) should be placed *fifth*?
-

Paragraph 5 (Questions 81-85):

- a They acquired a total of six dogs over a period of four months.
- b Shortly after they took in the mother spaniel, three little strays — a brown boxer, a spotted setter, and a bedraggled mutt — successively turned up.
- c Then, after several months, as if things weren't already loud enough, someone left a German shepherd with them.
- d A beautiful blond cocker spaniel and one of her litter were the first two.
- e This all goes to show that some people have hearts too big for their own good.

- 81 Which sentence (a, b, c, d, or e) should be placed *first*?
 - 82 Which sentence (a, b, c, d, or e) should be placed *second*?
 - 83 Which sentence (a, b, c, d, or e) should be placed *third*?
 - 84 Which sentence (a, b, c, d, or e) should be placed *fourth*?
 - 85 Which sentence (a, b, c, d, or e) should be placed *fifth*?
-

STOP!

TEST 3: Mathematics

Form W

DIRECTIONS: Read each question. Decide which one of the answers given below is correct. Then, on your separate answer sheet, fill in the space which has the same letter as the answer you have chosen. Use a separate sheet of paper for all figuring.

SAMPLE

- A If $3 + x = 5$, then $x =$
 a 8 b 2 c -2 d -8

PART A

- 1 $(+10) + (-2) =$
 a +8 b +12 c -12 d -20
- 2 If the number of boxes on a table is x and the number of pencils in each box is y , the total number of pencils can be expressed as —
 e y^x f xy g x^y h $x(x+y)$
- 3 $(-3) \times (+2) =$
 a +6 b -6 c +1 d -1
- 4 If $p = \frac{1}{2}mv$, and $m = 4$, $v = 3$, then —
 e $p = 72$ g $p = 18$
 f $p = 36$ h $p = 6$
- 5 The number that can replace x to make the equation $3x + 21 = 36$ a true statement is —
 a 5 b 15 c 19 d 57
- 6 The pair of equations $\begin{matrix} x + y = 10 \\ x - y = 8 \end{matrix}$ is satisfied when —
 e $x = 10, y = 8$ g $x = 8, y = 0$
 f $x = 8, y = 2$ h $x = 9, y = 1$
- 7 $(-5) \times (-2) =$
 a +3 b -3 c +10 d -10
- 8 The pattern $\begin{matrix} (4+1) \times (4-1) = 16-1 \\ (5+1) \times (5-1) = 25-1 \\ (6+1) \times (6-1) = 36-1 \end{matrix}$ could be written, in general, as —
 d $b^2 - 4ac > 0$
 f $(n+1) \times (n-1) = (n \times n) - 1$
 g $n \times (n-1) = n^2 - 1$
 h $(7+1) \times (7-1) = 49 - 1$

- 9 A square root of 1596 is approximately —
 a 25 b 30 c 35 d 40
- 10 Which of the following has the largest value?
 e 2^6 f 2^{-3} g 5^{-3} h 5^3
- 11 Which number is a prime?
 a 6 b 7 c 8 d 9
- 12 Ten grams of chemical X combine with 12 grams of chemical Y. If the same proportions are used, 25 grams of chemical X will combine with how many grams of chemical Y?
 e 60 f 32 g 30 h 24
- 13 The number that can replace x and satisfy the equation $2x + 3 = 15$ will also satisfy the equation —
 a $\frac{1}{2}x + 8 = 10$ c $18 - x = 15$
 b $3x - 2 = 15$ d $x + 7 = 13$
- 14 If the set $S = \{2, 3, 4, 5, 6\}$ and the set $T = \{1, 3, 5, 9, 11\}$, then the intersection $S \cap T$ is —
 e $\{3, 5\}$ g $\{1, 7\}$
 f $\{1, 2, 3, 4, 5, 6, 9, 11\}$ h none of the above
- 15 The statements that $A = \{3, 4, 5\}$ and $B = \{4, 5\}$ imply —
 a A and B are not sets
 b B is a set, but A is not a set
 c B is a subset of A
 d A is a subset of B
- 16 $\frac{1}{2}(x^3 - x^2)$ could be expressed in words as —
 e the difference between one half of x cubed and x squared
 f one half of x to the first power
 g one half of the difference between x cubed and x squared
 h x to the three-halves power minus x
- 17 Triangles ABC and $A'B'C'$ are similar. John measured the sides of the two triangles as —
 side $AB = 8$ in. side $A'B' = 32$ in.
 side $BC = 10$ in. side $B'C' = 38$ in.
 side $AC = 9$ in. side $A'C' = 36$ in.
 Which side of triangle $A'B'C'$ did he measure incorrectly?
 a side $B'C'$
 b side $A'C'$
 c side $A'B'$
 d All sides have been measured correctly.

GO ON TO THE NEXT PAGE ►

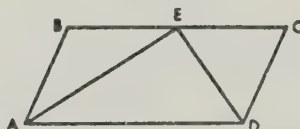
- 18 The value of $x^3 + x^2 - 1$ will be greater than one for —

e all negative values of x
 f all values of x less than one
 g all values of x greater than one
 h $x = 0$

- 19 If $\frac{1}{3}x = 1$, $x =$

a $\frac{1}{3}$ b $\frac{2}{3}$ c $1\frac{1}{3}$ d 3

- 20 .



In the figure shown, the area of parallelogram $ABCD$ is how many times as large as the area of triangle AED ?

e 1.5 f 2 g 2.5 h 3

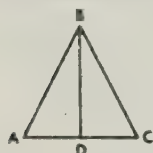
- 21 $xyz - yzx + zxy =$

a $x(y - z) + xzy$ c $x^2y^2z^2$
 b $2xyz$ d xyz

- 22 If two angles of a triangle are 55° and 35° , the triangle must be —

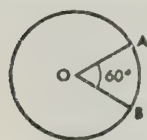
e a right triangle g an equilateral triangle
 f an isosceles triangle h none of the above

- 23 If BD is perpendicular to AC and the length of AD is equal to the length of DC , then —



a $\triangle ABD$ is congruent to $\triangle DBC$
 b $\triangle ABC$ is congruent to $\triangle BCD$
 c $\triangle ABD$ is congruent to $\triangle BAD$
 d none of the above

- 24 If the area of circle O is 12 square units, then the area of the sector AOB is —



e 1 square unit
 f 2 square units
 g 3 square units
 h 4 square units

- 25 $x + y = 12$

$$y - z = 7$$

$$2x + w = 13$$

$$w + 5 = 19$$

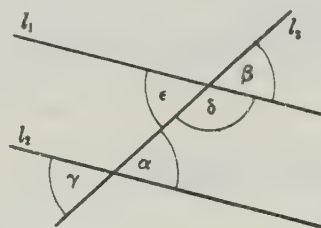
This system of simultaneous equations is satisfied when —

a $x = 3, y = 9, z = 0, w = 14$
 b $x = 2, y = 9, z = 2, w = 14$
 c $x = 4, y = 8, z = 2, w = 14$
 d none of the above

- 26 The equation $x^2 + 3x + 2 = 0$ has the roots —

e -2, -1 f 2, 1 g 3, 2 h -3, -2

- 27



Given: Line l_1 is parallel to line l_2 .

Therefore:

a Angle α , angle δ , and angle γ must all be equal.
 b Angle α , angle β , and angle γ must all be equal.
 c Angle α must equal angle δ .
 d Angle α and angle β must be equal, but angle γ need not equal angle β .

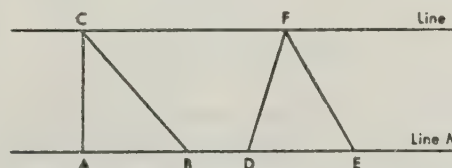
- 28 If $\frac{b}{a} = \frac{d}{c}$, then —

e $a = \frac{cd}{b}$ g $c = \frac{ab}{d}$
 f $b = \frac{ad}{c}$ h $d = \frac{ac}{b}$

- 29 If a , b , and c represent numbers, then the fact that $(a \times b) + c = c + (b \times a)$ is a consequence of —

a the associative and distributive laws
 b only the commutative law of multiplication
 c only the associative law of multiplication
 d the commutative law of addition and the commutative law of multiplication

- 30



If lines L and M are parallel and the segments AB and DE have equal lengths, what can you say about the area of triangles ABC and DEF ?

e Triangle ABC has a larger area.
 f Triangle DEF has a larger area.
 g The areas must be equal.
 h It is impossible to determine the relative size of the triangular areas from the information given.

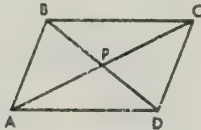
- 31 The sum of the interior angles of an arbitrary quadrilateral must be —

a less than 360°
 b exactly 360°
 c more than 360°
 d The sum is not determined if the ratios of the sides are not given.

32 The solution of the equation $5x + 3 = 14$ is a —

- e positive integer
- f negative integer
- g complex number with a nonzero imaginary part
- h fraction (in lowest terms) with denominator 5

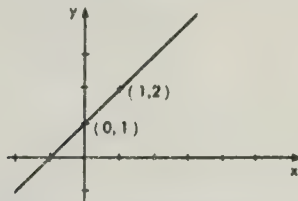
33



If figure $ABCD$ is a parallelogram, we could prove that $\angle BAC$ is congruent to $\angle DCA$ because —

- a both are right angles
- b they are vertical angles of two intersecting lines
- c they are alternate interior angles of parallel lines cut by a transversal
- d this follows directly from the Theorem of Pythagoras

34



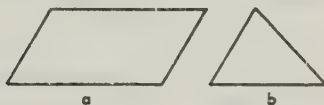
The line segment shown is part of the graph of which equation?

- e $y = 2x + 1$
- g $2y + x = 1$
- f $y = x + 1$
- h $\frac{x-2}{y-1} = 1$

35 $3x^3 - 12x =$

- a $(3 - x)(x^2 - 11)$
- c $3x(x - 2)(x + 2)$
- b $3x(x^2 - x - 4)$
- d $3x^2(x - 4)$

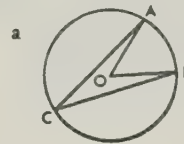
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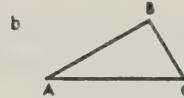
If the areas enclosed by figures a and b are placed so that they share a common segment of boundary without the areas overlapping, then —

- e the perimeter of the new figure is the sum of the perimeters of a and b
- f the area of the new figure is less than the sum of the areas enclosed by a and b
- g the perimeter of the new figure is less than the sum of the perimeters of a and b
- h the area of the new figure is greater than the sum of the areas enclosed by a and b

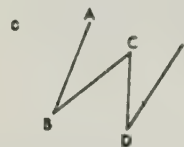
37 Which of the following represents a correct theorem?



Given: AO and BO are radii of circle O
Therefore: $\angle ACB = \frac{1}{2}\angle AOB$

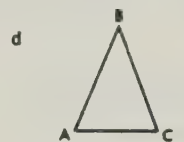


Given: ABC is a right triangle
Therefore: $\angle BAC = \frac{1}{2}\angle BCA$



Given: Angles ABC , BCD , and CDE are all acute angles

Therefore:
 $\angle BCD = \angle ABC + \angle CDE$



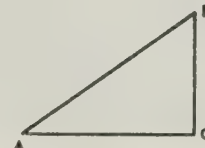
Given: $AB = BC$

Therefore:
 $\angle ABC = \angle BAC + \angle BCA$

38 The roots of the equation $x^2 - 8x + 15 = 0$ are —

- e -3 and -5
- g 8 and 15
- f 3 and 5
- h -8 and -15

39



In the triangle shown, angle BCA is a right angle and $\overline{AC} > \overline{BC}$. Therefore —

- a $\angle BAC > 60^\circ$
- c $\angle ABC > 45^\circ$
- b $\angle ABC > 60^\circ$
- d $\angle BAC > 45^\circ$

40 Which of the following equations cannot be solved in the number system listed?

- e $x^2 + 1 = 0$, in the system of complex numbers
- f $x + 2 = 5$, in the system of positive integers
- g $3x = 7$, in the system of rational numbers
- h $2x + 1 = 4$, in the system of integers

DIRECTIONS: Read each question. Decide which one of the answers given below is best. Then, on your separate answer sheet, fill in the space which has the same number as the answer you have chosen.

SAMPLE

A The earth is in orbit around —

- | | |
|------------|-----------|
| 1 Venus | 3 the sun |
| 2 the moon | 4 Mars |

PART A: SECTION I — PHYSICAL SCIENCE

1 The amount of water in the wells of a neighborhood is a good indication of the —

- 1 fertility of the soil
- 2 water table of the area
- 3 summer climate
- 4 type of irrigation used

2 An ore is valuable because it —

- 5 contains a nonmetal substance that is used in plastics
- 6 is plentiful in most countries
- 7 is a source of useful material
- 8 is a soft rock that is easily crushed

3 When someone slams the door of a car in which you are riding, sometimes your ears "pop" because of —

- 1 sound waves going through the frame
- 2 a reflex action
- 3 increased air pressure
- 4 a slight discharge of static electricity

4 A large refrigerator can be lifted by one person if he can use a mechanical advantage. He can get this by —

- 5 asking a friend to lean on the refrigerator
- 6 tipping the refrigerator sideways
- 7 using centrifugal force
- 8 using a lever

5 Two of the world's famous astronomers have studied independently what is known about the origin of the universe and have arrived at contradictory theories. What would be best to think concerning their disagreement?

- 1 Both persons are probably wrong.
- 2 More evidence is needed to resolve their differences.
- 3 Both persons are probably right.
- 4 The problem is too involved for solution.

6 The main reason that the sunlit side of the moon reaches a very high temperature is that —

- 5 there is little or no atmosphere
- 6 the moon is so small
- 7 there is a lack of shielding vegetation
- 8 there are no large bodies of water

7 A jet engine can propel an airplane for the same reason that a —

- 1 slow-moving bicycle can be stopped quickly
- 2 sound travels faster in cold than in warm water
- 3 person can travel downhill on a sled
- 4 rifle "kicks" against your shoulder when fired

8 The cutters in a whirling, electrical garbage disposal unit are placed at the outside edge because of the phenomenon of —

- 5 gravity
- 6 the hardness of metal
- 7 centripetal force
- 8 indirect current

9 You are asked to design a glass window for a house. Which one of these choices would be most effective in preventing temperature changes within the house due to external temperature changes?

- 1 two panes $\frac{1}{8}$ " thick set and sealed $\frac{1}{2}$ " apart
- 2 one pane $\frac{3}{8}$ " thick
- 3 one pane $\frac{1}{4}$ " thick
- 4 two panes $\frac{1}{8}$ " thick glued tightly together

10 Sound travels more rapidly in the water than in air. This can be partly explained by the fact that water molecules are —

- 5 closer together than are air molecules
- 6 not moving
- 7 made of two gases, oxygen and hydrogen
- 8 larger than air molecules

11 If you place a drop of red ink in a tall glass of water, it will eventually spread throughout the water without any stirring because of —

- 1 eddy currents in the water
- 2 the cohesion between the water and ink
- 3 mutual repulsion among the ink molecules
- 4 molecular motion

- 12 Four small pools have the same amount of water. The nature of the water and the temperature of the pools are all the same. The water will evaporate first from the pool whose surface area and depth are respectively —
- 5 2 square feet, and 36 inches
 - 6 3 square feet, and 24 inches
 - 7 1 square foot, and 72 inches
 - 8 4 square feet, and 18 inches
- 13 Many scientists believe that the sun and planets were formed by the contraction of a huge mass of hydrogen gas. If this hypothesis is correct, it is likely that —
- 1 the stars are cooler than their planets
 - 2 the sun was once a dwarf star
 - 3 other stars like the sun may have planets
 - 4 the sun was once more dense
- 14 Sheets of paper sometimes stick together as they come out of a mimeograph machine because —
- 5 the sides of adjacent sheets have the same charge
 - 6 the sides of adjacent sheets have opposite charges
 - 7 adjacent sheets have lower pressure between them
 - 8 the mimeograph machine is on a metal stand
- 15 The heating elements of electric heaters are made of a special wire which —
- 1 has a relatively high melting point
 - 2 has little resistance
 - 3 increases the voltage
 - 4 uses little power
- 16 At the same depth, the pressure at the bottom of a pan of gasoline is lower than for a pan of water because —
- 5 gasoline does not mix with water
 - 6 gasoline is less dense than water
 - 7 gasoline evaporates faster than water
 - 8 the water is colder than the gasoline
- 17 Shears will cut metal with the least force applied to them when they have —
- 1 short blades and long handles
 - 2 short blades and short handles
 - 3 long blades and long handles
 - 4 long blades and short handles
- 18 Regulations governing the use of electrical equipment in schools require a 3-pronged outlet plug on the cord of electric motors, hot plates, and other electrical equipment, primarily to —
- 5 reduce the cost of the current
 - 6 prevent the equipment from overheating
 - 7 insure the safety of the pupils who use the equipment
 - 8 increase the life span of the equipment
- 19 If you heat sulfur and iron over a strong flame until the mixture glows, a magnet will no longer pick up the residue because —
- 1 the iron has evaporated
 - 2 the sulfur insulates the iron
 - 3 you now have iron sulfide
 - 4 the iron has been transformed to nickel
- 20 A person becomes warmer when he wears a coat for the same reason that —
- 5 rubbing sandpaper makes heat
 - 6 sitting near a fire warms a person
 - 7 a refrigerator stays cold inside
 - 8 water in a teakettle becomes warmer
- 21 Hot water may aid you in loosening the tightly fastened lid of a jar for the same reason that —
- 1 perspiring cools your skin
 - 2 a nutcracker provides mechanical advantage
 - 3 a basketball bounces
 - 4 the liquid rises in a thermometer
- 22 A "humorous" friend says to you, "Hand me that device whose fulcrum is between the force applied and the resistance." He is asking for —
- 5 the nutcracker
 - 6 the scissors
 - 7 the wheelbarrow
 - 8 a chisel
- 23 Jet aircraft are more efficient than propeller-driven aircraft at high altitudes because the air is —
- 1 less dense than at low altitudes
 - 2 denser than at low altitudes
 - 3 nearly motionless at high altitudes
 - 4 warmer than at low altitudes

- 24 One student said to another, "It feels like earthquake weather. The air is muggy and close; there's no wind at all." The same day, a series of tremors shook the earth. Which is the best conclusion to draw from this remark?
- 5 More evidence of this kind was needed to really predict the earthquake.
 - 6 An earthquake was truly predicted.
 - 7 Cause and effect relations in this situation are fairly obvious.
 - 8 The student's observation and the earthquake happened by chance to be related in time and sequence.
- 25 It is safer generally for pilots to take off —
- 1 with the wind from the rear
 - 2 with the wind from the copilot's side
 - 3 headed into a wind
 - 4 with the wind from the pilot's side
- 26 Soil on a valley floor is composed largely of tiny pieces of the same rocks as are found above it. This statement is —
- 5 true under all conditions
 - 6 not true in mountainous regions
 - 7 true more often than not
 - 8 never true
- 27 Water accumulates on a window pane inside a room in the winter because the pane is —
- 1 warmer than the air outside
 - 2 warmer than the room air
 - 3 cooler than the room air
 - 4 cooler than the air outside
- 28 You have forgotten whether or not you have added baking soda to the biscuit batter. The best way to find out is to test a small sample by —
- 5 feeling it
 - 6 putting vinegar on it
 - 7 heating it
 - 8 smelling it
- 29 If you were to hunt for fossils, you would go to an area containing —
- 1 igneous rock
 - 2 sedimentary rock
 - 3 metamorphic rock
 - 4 a combination of rock types
- 30 A soil test on a bare spot in your lawn reveals that it is too acid. To improve the soil, you would probably add —
- | | |
|------------------|----------------|
| 5 an acid | 7 an acid salt |
| 6 a neutral salt | 8 a basic salt |
- 31 At 25 miles per hour, the same braking force stops a light car in 25 feet, a heavier car in 40 feet, an even heavier car in 55, and the heaviest of all the cars in 65 feet. This happens because —
- 1 horsepower equals foot pounds per second
 - 2 energy equals mass \times speed of light squared ($E = MC^2$)
 - 3 force equals mass \times acceleration ($F = MA$)
 - 4 for every action there is an equal and opposite reaction
- 32 You find that your car is stuck in the sand. Which would most likely relieve the slipping?
- 5 Increase your momentum by accelerating.
 - 6 Let some air out of the tires.
 - 7 Put on tire chains.
 - 8 Move someone from the back seat to the front.
- 33 In addition to the cloud factor, observation of which one of these other local air factors would be most helpful to note in predicting weather?
- | | |
|---------------|------------|
| 1 pressure | 3 humidity |
| 2 temperature | 4 velocity |
- 34 Water puts out a fire primarily by —
- 5 covering it with a film of steam
 - 6 absorbing its smoke
 - 7 cooling it off
 - 8 absorbing the oxygen from the air
- 35 An eclipse of the moon actually begins —
- 1 1.3 sec. before we see it
 - 2 at the same time we see it
 - 3 2.5 sec. before we see it
 - 4 8 sec. after we see it

PART A: SECTION II — LIFE SCIENCE

- 36 The basic way vaccination works to prevent disease in our bodies is to —

- 5 increase the sugar level in the blood
- 6 build a protective wall of tissue around the vital organs
- 7 cool the feverish temperature
- 8 increase the antibodies which may attack the disease germs

- 37 A person is most likely to acquire, rather than to inherit, —

- 1 his accent
- 2 the color of his eyes
- 3 naturally curly hair
- 4 the shape of his head

- 38 Chlorine has been used extensively in city water supplies to —

- 5 protect children's teeth
- 6 kill harmful organisms
- 7 improve the taste
- 8 make it more nutritious in basic minerals

- 39 Your body gets warmer when you exercise for the same reason that —

- 1 the ceiling of a room is warmer than the floor
- 2 a fire becomes hotter when more fuel is added
- 3 a rock becomes hotter the longer the sun shines on it
- 4 the atmosphere becomes hotter over land than over water

- 40 If the general population of animals and plants remains constant, a large decrease in the population of all kinds of snakes will usually be followed by an increase in the number of —

5 earthworms	7 rodents
6 butterflies	8 deer

- 41 A scientist is characterized chiefly as one who —

- 1 studies trends and tries to profit from them
- 2 sets up hypotheses, observes, and verifies
- 3 believes in leaving traditions and beliefs undisturbed if they seem to be working out well
- 4 accepts the truths of his times as absolutes

- 42 The process of digestion is possible because of the secretion of —

5 protein hormones	7 enzymes
6 steroids	8 insulin

- 43 The chief advantage of slow, waterless cooking is the —

- 1 retention in the food of vitamins and minerals
- 2 ease of cleaning the utensils afterward
- 3 very low fuel costs
- 4 improvement made in food flavors

- 44 Which of the following does *not* cause a loss of topsoil?

- 5 strong winds
- 6 single-crop system
- 7 flash floods
- 8 heavy crop cover

- 45 Many leaves lose their green color and take on the hues of yellow and orange in the autumn because —

- 1 yellow and orange pigments are produced when nights are longer
- 2 the days are shorter
- 3 light continuously destroys chlorophyll
- 4 lower temperatures stop chlorophyll production

- 46 If the heartbeat rates of the following animals were compared, in what order would they rank, from the *fastest* to the *slowest*?

- 5 bird, dog, man
- 6 man, bird, dog
- 7 man, dog, bird
- 8 dog, man, bird

- 47 The continual use of marijuana is usually accompanied by —

- 1 cancer
- 2 insanity
- 3 emotional instability
- 4 alcoholic addiction

- 48 A practice that may cause a row-crop farm to lose much good soil by erosion is —

- 5 plowing along the contours of the hills
- 6 alternating, around hills, strips of plowed land with a cover crop
- 7 cutting terraces on hilly land
- 8 plowing straight rows over the hills

- 49 Which of the following is usually the *least* effective means of controlling harmful insects?

- 1 sprays and contact poisons
- 2 quarantining problem areas
- 3 conservation and propagation of insect enemies
- 4 environmental controls (eliminating food, breeding areas, etc.)

- 50 One reason why marine algae are especially important to most aquatic animals is that they —
- 5 remove wastes
 - 6 block harmful sunlight
 - 7 warm surface water
 - 8 produce free oxygen
- 51 A farmer wants to use a poison to kill an insect pest without harming the beneficial insects. He would probably get the best advice from an expert in insect —
- 1 toxicology
 - 2 genetics
 - 3 cytology
 - 4 histology
- 52 In organisms which have been subjected to penetrating radiation, the most frequently detected effect upon their offspring has been an increase in the —
- 5 viability of the offspring
 - 6 per cent of superior offspring
 - 7 number of viable mutations
 - 8 male-female ratio
- 53 The general effect of a sudden increase in the secretion of adrenalin is to —
- 1 prepare the body for an emergency
 - 2 relax muscles of the arms and legs
 - 3 increase the acuity of vision
 - 4 increase the rate of food digestion in the stomach
- 54 A person has received severe wounds in an automobile accident. To promote repair of body tissues, he is properly advised to eat more —
- 5 cereals
 - 6 vegetables
 - 7 fruits
 - 8 meats
- 55 A small town located between a fast-flowing river and a few small roadside ponds is plagued by mosquitos. What single measure would be best to take?
- 1 Drain the ponds.
 - 2 Spray the river and pond each year with insecticides.
 - 3 Issue mosquito-proof skin oil to each inhabitant.
 - 4 Spray a light film of oil on the river.
- 56 Some species survive because many individuals are produced from which at least a few survive. Other species also survive even though few individuals are produced because the chance of survival for each individual is good. In the latter case, reproduction is generally by —
- 5 spores
 - 6 fission
 - 7 budding
 - 8 fertilization
- 57 If you wished to illustrate the presence of carbon dioxide in exhaled air, the best experiment would be to —
- 1 bubble exhaled air through a sugar solution
 - 2 show that a mouse cannot live long on exhaled air
 - 3 bubble exhaled air through a solution of lime water
 - 4 show that animals live well in an environment of exhaled air
- 58 Plants increase their capacity to absorb water and minerals by —
- 5 growing longer roots
 - 6 growing root hairs
 - 7 increasing the root diameter
 - 8 developing nodules
- 59 Which one of the following graftings appears contrary to the principles of nuclear control of cellular activity?
- 1 grafting a bud from a peach tree to a pine tree
 - 2 grafting a bud from a tangerine tree to a lemon tree
 - 3 grafting skin from a man's leg to the top of his head
 - 4 grafting a piece of skin from the hind leg to the foreleg of a frog
- 60 When we see a car, our organs of vision are being stimulated by —
- 5 all of the light absorbed by the car's surface
 - 6 some of the light reflected by the car's surface
 - 7 all of the light reflected by the car's surface
 - 8 some of the light absorbed by the car's surface

TEST 6: Social Studies

Form W

DIRECTIONS: Read each question. Decide which one of the answers given below is *best*. Then, on your separate answer sheet, fill in the space which has the same number as the answer you have chosen.

SAMPLE

A The resource which has helped most to make southwestern Asia more prosperous is —

- | | |
|----------|---------------|
| 1 water | 3 electricity |
| 2 cattle | 4 oil |

1 The largest country in area in South America is —

- | | |
|-------------|-------------|
| 1 Argentina | 3 Chile |
| 2 Brazil | 4 Venezuela |

2 The principles expressed in the Declaration of Independence are in large part the political ideas of —

- 5 Samuel Adams
- 6 George Washington
- 7 John Hancock
- 8 Thomas Jefferson

3 The most common type of city government in the United States today is the —

- | | |
|-----------------|----------------|
| 1 commission | 3 city manager |
| 2 mayor-council | 4 commune |

4 Generally considered an example of American intervention in the affairs of Latin America, the building of the Panama Canal also proved to be —

- 5 of great value in world commerce between the Atlantic and the Pacific Oceans
- 6 a reason for friendly relations between Panama and the United States
- 7 of great use to the United States in the Spanish-American War
- 8 more to the advantage of Latin America than to that of the United States

5 Humanitarianism can best be described as a feeling of —

- 1 pride in the accumulation of material things
- 2 deep regret that the government has interfered with business activities
- 3 deep concern for the welfare of unfortunate peoples
- 4 faith in the guidance of a supreme being

6 In a republican form of government, the officials are chosen by —

- 5 revolutionary action
- 6 a board of electors in the federal government
- 7 the absolute ruler
- 8 the citizens or their representatives

7 All of the following led to the development of the factory system *except* —

- 1 existence of large amounts of capital for investment
- 2 opening up of free land in the West
- 3 a large labor force
- 4 availability of a ready market

8 Which of the following was the result brought about by the other three?

- 5 demand for reasonable hours and wages
- 6 campaign for free silver
- 7 formation of the Populist Party
- 8 farmers' grievances against the railroads

9 Which of the following statements best illustrates "nationalism" as a force in modern history?

- 1 It has promoted free trade among nations.
- 2 It has inspired many peoples in their struggle for independence and democracy.
- 3 It has made the work of international organizations such as the League of Nations much easier.
- 4 It has facilitated the exchange of ideas by leading scientists of the world.

10 A major change in the status of agriculture since 1900 has been —

- 5 an increasing number of workers in agriculture
- 6 a decreasing interest in tariffs
- 7 the adoption of many of the methods and techniques of industry
- 8 a closer tie between farmer and laborer

11 Which of the following land masses is very sparsely populated?

- 1 Australia
- 2 Ceylon
- 3 Japan
- 4 Republic of Indonesia

GO ON TO THE NEXT PAGE ►

- 12 The policy of neutrality as stated by President Washington —
- 5 is as applicable today as it was in the 18th century
 - 6 was abandoned after the Spanish-American War
 - 7 has never been applied since Washington's day
 - 8 was designed to meet the needs of a young nation
- 13 Which of the following is a statement of opinion?
- 1 Colonial territories should become independent nations.
 - 2 At least four former European colonies in Africa became nations after 1950.
 - 3 The new states of Asia and Africa have held conferences to discuss mutual problems.
 - 4 President Kennedy said the United States should increase aid to Latin American countries.
- 14 When there is so much more money in circulation than there are goods to buy that prices are excessively high, the economy is in a period of —
- 5 deflation
 - 6 inflation
 - 7 prosperity
 - 8 panic
- 15 Which of the following was *not* a social or cultural change brought about by the Industrial Revolution?
- 1 recognition of women's rights
 - 2 growth of organized labor
 - 3 spread of public education
 - 4 closer ties between the church and state
- 16 The United States has a federal government because, although definite powers are granted to the nation and to the states, the —
- 5 power of the states has been granted by Congress
 - 6 power of the central government is stronger than that of the states
 - 7 state governments may reject national legislation
 - 8 national government controls foreign affairs
- 17 In the corporate form of business organization, which group officially declares the dividends?
- 1 stockholders
 - 2 management
 - 3 board of directors
 - 4 workers
- 18 A "states rights" advocate, if he were consistent in his behavior, would oppose —
- 5 election of members to a board of education in a city
 - 6 building interstate highways
 - 7 passing of stronger divorce laws by a state
 - 8 federal aid to education
- 19 Although the United Nations has not been as successful as was hoped, the organization has played an important role in attaining world peace in all of the following, *except* —
- 1 success in achieving a disarmament agreement
 - 2 increased economic aid through U.N. agencies
 - 3 intervention by a U.N. force in several instances to stop aggression
 - 4 achievements of the agencies for social advance
- 20 The most influential group in the United States in the latter 19th century consisted of the —
- 5 military leaders
 - 6 industrial leaders
 - 7 leaders of the Democratic party
 - 8 newspaper men
- 21 The quotas restricting immigration under the law of 1924 were based upon the immigrant's —
- 1 literacy
 - 2 country of origin
 - 3 occupation
 - 4 political affiliation
- 22 Germany became industrialized at a later date than England largely because Germany —
- 5 did not have extensive coal and iron resources
 - 6 was not as large in area
 - 7 did not have the necessary skilled workers
 - 8 was not politically unified until late in the 19th century
- 23 Which of the following was *not* a factor in increasing our national budgets in the decade following World War II?
- 1 expansion of government services to its citizens
 - 2 increasing value of the dollar
 - 3 economic and military aid given abroad
 - 4 need for research in scientific development for defense

24 Which statement best describes the role that major political parties have played in United States history?

- 5 They have brought about reforms in government long before the people were willing to accept them.
- 6 Each major party has followed a consistent policy with respect to the role government should play in the lives of its people.
- 7 Each major party has been motivated by a desire to express the wishes of the people in order to win elections.
- 8 They have been motivated by a desire to build a "utopian" society.

25 Which of the following characteristics of 20th century nations *least* resembles the manor of the feudal period?

- 1 maintenance of military forces
- 2 attempt to be "self-sufficient"
- 3 "open" society in most Western nations
- 4 loyalty of most citizens to their nations

26 An important feature of the 20th century is the development of technology. It has had the *least* impact upon which of the following fields?

- 5 transportation
- 6 fine arts
- 7 recreation
- 8 medical science

27 The control of backward countries by strong nations through managing trade, granting special industrial concessions, and investing heavily in the country's resources is called —

- 1 economic imperialism
- 2 economic aid
- 3 self-determination
- 4 reciprocal trade

28 A bill proposed in the United States Senate may never come to a vote on the Senate floor because it may —

- 5 be rejected by a joint committee of the House and Senate
- 6 be vetoed by the President
- 7 never be assigned to a committee
- 8 be killed in committee

29 In which one of the following is the governmental level correctly matched with the type of tax which it levies?

- 1 federal government — water tax
- 2 state government — tariff
- 3 local government — income tax
- 4 school district — property tax

30 The free world of 1960 took collective action to defend the democratic countries from Communist aggression by the establishment of a —

- 5 plan for disarmament
- 6 plan to provide freer trade through reciprocal trade agreements
- 7 protecting military organization of the countries in Europe and the Western Hemisphere
- 8 policy of the United Nations' giving aid to the Chinese Nationalist government

31 All of the following were the rights of Englishmen which the colonists charged were being denied them, *except* —

- 1 the right of trial by jury
- 2 the right to be represented in their government
- 3 the power to elect a president
- 4 freedom from unjust taxation

32 The reason for stating the Declaration of Independence was to —

- 5 begin hostile operations against Great Britain
- 6 set up a new government for the colonies
- 7 explain to the world why the American colonies should fight
- 8 end a bloody war

33 Which of the following religions has the greatest number of followers on the African continent?

- 1 Moslemism
- 2 Buddhism
- 3 Zoroastrianism
- 4 Hinduism

34 The reasons for the United States' becoming involved in World War II were similar to those which involved her in World War I in all of the following, *except* —

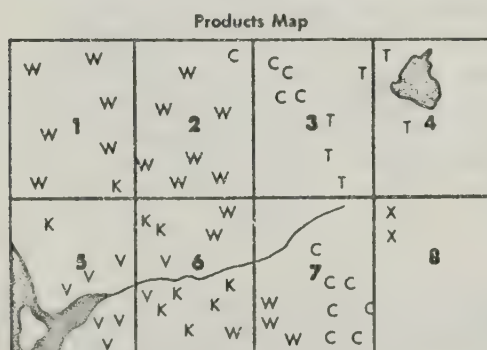
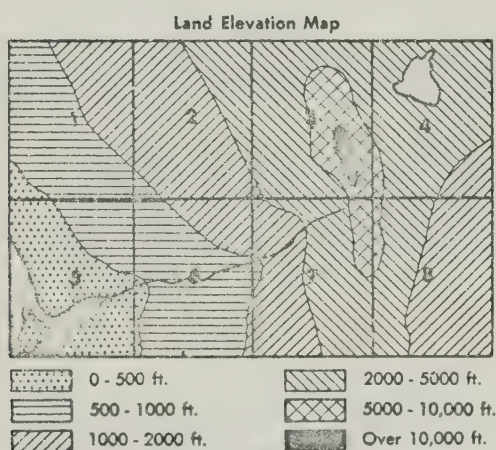
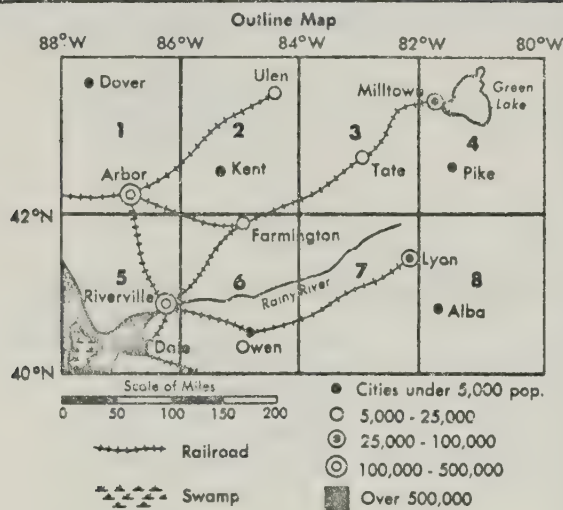
- 5 a challenge to our policy of neutrality
- 6 our trading interests in the world market
- 7 an act of aggression by an Asian country
- 8 the desire of the United States to protect democratic principles in the world

35 In order to encourage the expansion of industry in some Latin American countries such as Mexico, Brazil, and Argentina, the government has —

- 1 abolished income taxes
- 2 encouraged the holding of large estates
- 3 urged investment of Latin American capital in foreign countries
- 4 set up corporations in the steel and oil industries

TEST 6: Social Studies (Continued)

Form W



Each symbol represents the same amount of income

C — Cattle and sheep V — Vegetables
K — Corn W — Wheat
T — Forests X — Mining

(Questions 36-45 are based on these three maps of the same imaginary state. You may need to use one, or two, or sometimes all three maps to answer a question. Notice that each map is divided into sectors which are numbered.)

36 Which section of the state has the lowest elevation?

5 1 6 4 7 5 8 7

37 The shortest distance by railroad is between which of these cities?

- 1 Lyon to Milltown
- 2 Farmington to Milltown
- 3 Milltown to Riverville
- 4 Ulen to Tate

38 The product of the Milltown area is —

- 5 lumber
- 6 cattle
- 7 wheat
- 8 iron ore

39 The lumber industry is probably important at —

- 1 Tate
- 2 Lyon
- 3 Alba
- 4 Owen

40 The vegetable farms are located —

- 5 in the interior areas
- 6 at altitudes over 1000 feet
- 7 on an island
- 8 near a large city

41 Which city has a population between that of Lyon and that of Dover?

- 1 Milltown
- 2 Riverville
- 3 Arbor
- 4 Tate

42 How many canals are located on the map?

5 0 6 1 7 2 8 3

43 The altitude most suited to grazing is near —

- 1 sea level
- 2 500 ft.
- 3 3000 ft.
- 4 1500 ft.

44 The steepest railroad grade is probably near —

- 5 Tate
- 6 Arbor
- 7 Owen
- 8 Lyon

45 The town which is located at an approximate position of 43° N. latitude and 85° W. longitude is —

- 1 Tate
- 2 Ulen
- 3 Pike
- 4 Owen

GO ON TO THE NEXT PAGE ►

46 Most of the early labor unions in the United States were made up of —

- 5 unskilled laborers
- 6 apprentice seamen
- 7 textile workers
- 8 skilled craftsmen

47 An example of the use of an implied power by Congress is the —

- 1 declaration of war in 1941
- 2 passage of the Bland-Allison Act regarding coinage of money (1878)
- 3 enactment of the Clayton Antitrust Law in 1914
- 4 adoption of the Tariff of Abominations (1823)

48 Which of the following statements about the presidential election of 1860 would be most difficult to prove or disprove?

- 5 No party other than Republican or Democratic gained an electoral vote.
- 6 The platforms of the two parties were similar.
- 7 The popular majority was the smallest in American history.
- 8 The vote of the Southern states was the deciding factor.

49 The treaties of peace signed in 1919–20 dismembered the Austro-Hungarian Empire. Which was probably the *least* desirable result of this?

- 1 It resulted in the breakdown of an economic unit, which resulted in high tariffs among the new nations.
- 2 It led to the establishment of a buffer group of states between the East and West.
- 3 It afforded different nationalities their free, independent existence.
- 4 It caused the new states to develop strong armies for self-protection.

50 One demand of the Populist Party of the 1890's that was not realized until after World War II was —

- 5 limitation of the presidential term
- 6 the direct election of United States senators
- 7 a graduated income tax
- 8 the adoption of referendum and initiative in some states

(Questions 51 to 54 refer to the following map.)



51 Which state, founded as a haven for Quakers, has been a center of the iron and steel industry?

- 1 State I
- 2 State J
- 3 State K
- 4 State L

52 Which state, location of the first permanent English settlement in America, was the leading exporter of tobacco during the 17th century?

- 5 State G
- 6 State H
- 7 State K
- 8 State L

53 Because of dust storms, many inhabitants of the "Sooner State" migrated to California in the 1930's. From which state did they migrate?

- 1 State C
- 2 State D
- 3 State E
- 4 State M

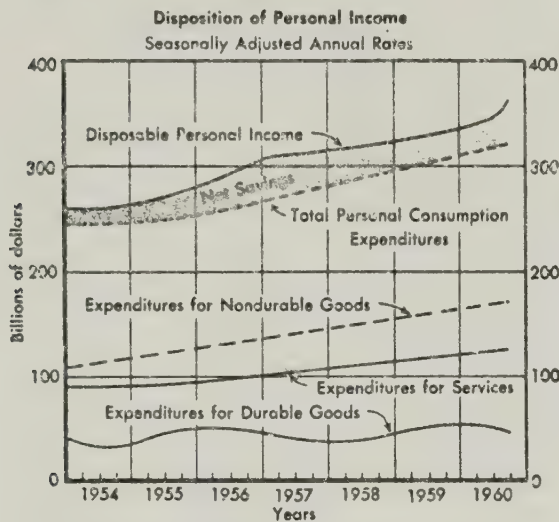
54 Which state, scene of the famous Scopes Trial, has benefited from the development of its water resources completed during Franklin D. Roosevelt's administration?

- 5 State D
- 6 State E
- 7 State F
- 8 State G

TEST 6: Social Studies (Continued)

Form W

(Questions 55-59 are based on the graph below.)



55 The year in which personal savings were lowest was —

- | | |
|--------|--------|
| 1 1960 | 3 1958 |
| 2 1955 | 4 1954 |

56 The net change from March 1954 to March 1960 in Total Personal Consumption Expenditures is how many billions of dollars?

- | | |
|-------|-------|
| 5 125 | 7 75 |
| 6 25 | 8 175 |

57 Total Personal Consumption Expenditures do not include expenditures for —

- 1 nondurable goods
- 2 taxes
- 3 services
- 4 durable goods

58 The above graph shows that the item with the greatest fluctuation from 1954 to 1959 was which of these?

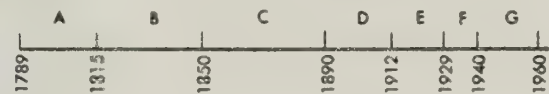
- 5 Disposable Personal Income
- 6 Expenditures for Services
- 7 Net Savings
- 8 Expenditures for Durable Goods

(Question 59 is based on the graph at the left.)

59 From this graph it is evident that —

- 1 the 1958 recession brought a marked drop in net savings
- 2 in 1958 the greatest increase was in expenditures for such articles as refrigerators and automobiles
- 3 the 1958 recession did not materially decrease the disposable income
- 4 increase in expenditures for services was almost 100 billion dollars

(Questions 60-63: On the time line, the letters A-G represent time intervals. Select the letter that indicates the time interval within which the event occurred.)



60 The United States joined the North Atlantic Treaty Organization.

- | | |
|-----|-----|
| 5 D | 7 F |
| 6 G | 8 E |

61 President Jefferson requested Congress to pass the Embargo Act.

- | | |
|-----|-----|
| 1 B | 3 D |
| 2 A | 4 C |

62 The Monroe Doctrine was proclaimed.

- | | |
|-----|-----|
| 5 B | 7 D |
| 6 A | 8 C |

63 The United States acquired Florida from Spain.

- | | |
|-----|-----|
| 1 B | 3 D |
| 2 A | 4 C |

STOP!

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